Intelligent Rain Detection Module User Manual

1. Introduction

This intelligent rain detection module is mainly intended for automatic wiper control of security cameras. When installed inside a camera windshield, the module is capable of sensing precise rainfall status on glass surface of the windshield and feeds back information(no rain, light rain, moderate rain, or heavy rain) to a host by UART, then the host can control the wiper get rid of the raindrops on the windshield to ensure a clear view for the camera in rainy conditions. It features as follows:

- Based on optical sensing system, accurately detects rainfall status on glass and sends information to host via UART;
- HALIOS®-SD measurement method, high robustness against strong sunlight;
- Less environmental interference and longer service life since the product is used inside windshields without direct exposure to external natural environment;
- Tiny body with a diameter of 12.5±0.15mm, suitable for cameras of all kinds;
- CRC-8 check for improving anti-interference ability in communication;
- Partial parameters setup can be changed by UART configuration;
- Error self-diagnostic, actively sends error status to host via UART;
- Optical system self-calibration;
- Ambient light detection, providing cameras with more auxiliary parameters;
- On-board temperature detection, excellent temperature linearity to ensure accurate measurements;
- Supporting optical sleep mode to extend the service life of the optic components.

1.1 Product Figure

The product figure is shown in Figure 1.1

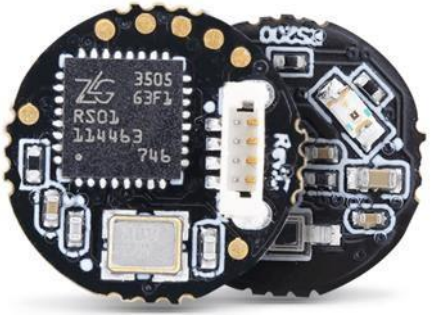

Figure 1.1 Product Figure

1.2 Detailed Functions

The module communicates with the camera host via UART, and the camera host uses all the functions of the module through UART commands. For example, the module sends the rainfall status to the camera host via UART; the camera host configures the module's rain detection sensitivity and other parameters via UART. Each function will be described in detail below. For convenience, the "slave" refers to the rain detection module, and the "host" refers to the camera host hereafter.

1.2.1 UART Communication

The UART configuration is shown in Table 1.1.

Table 1.1 UART Configuration

Baud Rate	115200
Data Bit	8bit
Stop Bit	1bit
Check Bit	NONE

Each UART command includes 5 Bytes of data and the frame format is as shown in Table 1.2. The **frame header** is fixed 0x3A, as shown in Table 1.3; the **frame flag** and **frame data** represent a frame data, as shown in Table 1.4. **FCS** represents the CRC-8 checksum value of the frame flag and the frame data, as shown in Table 1.5.

Table 1.2 UART Frame Format

Frame Header	Frame Flag	Frame Data	FCS CRC-8
1Byte	1Byte	2Byte	1Byte

Table 1.3 Frame Definition

Frame Header[7:0]	Frame Header Definition
0x3A	Each frame of 5 Byte data must start with 0x3A (colon character":" in ASCII)

Table 1.4 Definition of Frame Flag & Frame Data

Frame Flag[7]: Data Read & Write Property	Frame Flag[6:0]: Data Number	Frame Data [15:0]: Data Value	Description
0 (Read) 1 (Write)	0 (Firmware Version)	X	Frame Data [15:8] major version number, Frame data [7:0] backup version number
	1 (Rainfall Status)	0	No rain
		1	Light rain
		2	Moderate rain
		3	Heavy rain
	2 (System Status)	0	System normal
		1	RS200 Internal communication error
		2	LEDA damaged
		3	LEDB damaged
		4	Optical system calibration not good
		5	Parameter configuration failure
		6	Serial communication error (serial port check error)
		7	Low voltage warning (low voltage threshold 2.8V)
	3 (Optical System)	0	Perform optical system calibration
		1	Send optical system calibration value
	4 (Enter Real-time Rainfall Mode)	0	Exit real-time rainfall mode
		1	Enter real-time rainfall mode

Continued

Frame Flag[7]: Data Read & Write Property	Frame Flag[6:0]: Data Number	Data [15:0]: Data Value	Description
0 (Read) 1 (Write)	5 (Rainfall status output frequency or enable/disable)	0~9	Rainfall status output frequency, the default is 1, representing 50ms; it can be changed. Increasing or reducing 1 represents an increase or decrease of 50ms (output is disabled when it's 0)
	6 (No-rain/light-rain threshold V1)	0~65535	No-rain/light-rain threshold V1
	7 (Light-rain/moderate-rain threshold V2)	0~65535	Light-rain/moderate-rain threshold V2
	8 (Moderate-rain/heavy-rain threshold V3)	0~65535	Moderate-rain/heavy-rain threshold V3
	9 (No-rain/light-rain threshold S1)	0~65535	No-rain/light-rain threshold S1
	10 (Light-rain/moderate-rain threshold S2)	0~65535	Light-rain/moderate-rain threshold S2
	11 (Moderate-rain/heavy-rain threshold S3)	0~65535	Moderate-rain/heavy-rain threshold S3
	12 (Threshold of the number of times determined to be heavy rain in 10 measurements N1)	1~10	Threshold of the number of times determined to be heavy rain in 10 measurements N1
	13 (Threshold of the number of times determined to be moderate rain in 10 measurements N2)	1~10	Threshold of the number of times determined to be moderate rain in 10 measurements N2
	14 (Threshold of the number of times determined to be light rain in 10 measurements N3)	1~10	Threshold of the number of times determined to be light rain in 10 measurements N3
	15 (Ambient light detection mode)	0	Exit ambient light detection mode
		1	Enter ambient light detection mode
	16 (Host reads module temperature)	0	Host reads module temperature once
	17 (Module optical sleep	0	Exit sleep mode and enter rainfall detection
		1	Enter sleep mode

	mode)		

Table 1.5 FCS Definition

FCS[7:0]	Polynomial (HEX)	Data Reverse	Initial Value (HEX)	XOR Value (HEX)
CRC-8	x8+x5+x4+1 (0x31)	MSB First	0xFF	0x00

The module or the host has to go through a CRC-8 check when transmitting and receiving a frame of data. The function source code is as shown in the program list 1.1, and this function can be ported to the source code of the host.

When the module or the host sends a command, the 3Byte data of the frame flag and frame data will be used as an input parameter of function xCal_crc( ), and the check value will be calculated and filled into frame checksum to form one frame data.

When the module or host receives a frame of data, it needs to check the received data to ensure its correctness. The 4Byte data of frame flag, frame data and frame check will be used as input parameter of function xCal_crc( ), and the check value will be calculated. If the calculated check value is 0, then the received data is correct; if it is not 0, then the received data is incorrect.

Program List 1.1 CRC-8 Check Function Source Code

```
/*********************************************************************************************
** Function name:           xCal_crc
** Descriptions:            CRC-8 Check. Polynomial: 0x31; Data Reverse: MSB First;Initial Value: 0xFF; XOR Value: 0x00
** input parameters:        ptr: pointer to the data to be checked
**                          len: byte number of the data to be checked
** Returned value:          CRC-8 Check Value
*********************************************************************************************/
uint8_t xCal_crc(uint8_t *ptr, uint32_t len)
{
    uint8_t crc;
    uint8_t i;
    crc = 0xFF;
    while(len--) {
        crc ^= *ptr++;
        for(i = 0; i < 8; i++)
            { if (crc & 0x80)
            {
                crc = (crc << 1) ^ 0x0131;
            } else {
                crc = (crc << 1);
            }
        }
    }
    return crc;
}
```

The module uses an MCU with ARM Cortex-M0 core and adopts little-endian scheme by default, so during UART communication, the 8 low bits of the frame data [15:0] come first leading up to the high 8-bits. For example, if the value of frame data [15:0] is 5 in decimal, it is represented in the UART data stream as: 0x05, 0x00.

The module can not only send data to the host but also receive and execute commands from the host. To detect whether the UART communication line between the module and the host works normally, the host commands the module to send rainfall status or system status, and if it receives a reply from the module, it means that the communication works normally, otherwise there is something wrong with communication line.

Each command sent by the host must be continuous 5Byte data. If the idle time between any two bytes in the 5Byte data exceeds the transmission time of 10bit data, it will be judged as inter-byte timeout, and the previously received data will be invalidated and the receiver will receive data from the first byte of the command

again.

1.2.2 Firmware Version Query Function

Query the firmware version of the module. For the specific commands see Table 1.6.

Table 1.6 Firmware Version Command Query

Command Direction	Command Content (HEX)	Command Description
Host→Slave	3A 00 00 00 4B	The host queries the firmware version of the module.
Host←Slave	3A 80 xx xx xx	The module sends firmware version to the host.

Note: "Host→Slave" means the UART data is "sent by the host and received by the slave"; "Host ←Slave" means the UART data is "sent by the slave and received by the master"; the value of "xx" is determined by the actual data, below is the same.

1.2.3 Rainfall Detection Function

When the module detects the rain and the rainfall status output is enabled, it will feed back the rain status immediately, and it sends nothing for no rain; when the rainfall status output is disabled, the rainfall status can only be obtained by sending commands from host, and the module will send it to the host. The specific commands are as shown in Table 1.7.

Table 1.7 Commands Related to Rainfall States

Command Direction	Command Content (HEX)					Command Description
Host→Slave	3A	01	00	00	0D	The host queries the detected rainfall state from the module
Host←Slave	3A	81	00	00	D8	The module sends rainfall state to the host: no rain
Host←Slave	3A	81	01	00	2C	The module sends rainfall state to the host: light rain
Host←Slave	3A	81	02	00	01	The module sends rainfall state to the host: moderate rain
Host←Slave	3A	81	03	00	F5	The module sends rainfall state to the host: heavy rain

1.2.4 System State Detection Function

The module will automatically monitor its system status during operation, and if there is any abnormality in the system, the module will send the error status to the host. When the host queries the system status by commands, the module will report the current system status to the host and clear the last system error status.

Table 1.8 Commands Related to System Status

Command Direction	Command Content (HEX)					Command Description
Host→Slave	3A	02	00	00	C7	The host queries the module system status and clear system error status
Host←Slave	3A	82	00	00	12	The module sends system status to the host: normal
Host←Slave	3A	82	01	00	E6	The module sends system status to the host: normal: SPI communication error
Host←Slave	3A	82	02	00	CB	The module sends system status to the host: LEDA damaged
Host←Slave	3A	82	03	00	3F	The module sends system status to the host: LEDB damaged
Host←Slave	3A	82	04	00	91	The module sends system status to the host: optical system calibration not good

Host←Slave	3A	82	05	00	65	The module sends system status to the host: optical system parameter writing failure
Host←Slave	3A	82	06	00	48	The module sends system status to the host: received serial data check error
Host←Slave	3A	82	07	00	BC	The module sends system status to the host: the current voltage is too low

1.2.5 Optical System Calibration Function

Due to the optical path asymmetry of the system caused by processing, installation, etc., the module requires optical system calibration before use when installed to ensure the accuracy of rainfall detection. For detailed commands, refer to Table 1.9.

When the optical calibration is not good, please check whether there is anything wrong with the installation, after correcting it, clear the system error states first and then re-perform the optical calibration.

Note: Parameters V, S, N, frequency and calibration will be saved to internal Flash during configuration, so it is necessary to ensure a stable power supply.

Table 1.9 Optical System Calibration Commands

Command Direction	Command Content (HEX)					Command Description
Host→Slave	3A	83	00	00	54	The host commands module to perform optical system calibration
Host→Slave	3A	03	00	00	81	The host reads the optical system calibration value from the module
Host←Slave	3A	83	xx	xx	xx	The module sends the optical system calibration value to the host

1.2.6 Set Rainfall Status Output Frequency

When it's rainy, the module will output the corresponding rainfall status after it detects rain status, and the shortest interval of the feedback on the rain status is 50ms (in the case of N1=N2=N3=2. The interval will vary with the set N value). If the function is disabled, the module will not automatically output the rain status, instead, the host needs to read it actively. When the rainfall output frequency is set to be out of the range of 0~9, the module will return the error of parameter writing failure. For detailed commands refer to Table 1.10.

Note: Parameters V, S, N, frequency and calibration will be saved to internal Flash during configuration, so it is necessary to ensure a stable power supply.

Table 1.10 Rainfall Status Output Frequency Commands

Command Direction	Command Content (HEX)					Command Description
Host→Slave	3A	85	01	00	05	The host sets the rainfall status output frequency of the module to 1
Host→Slave	3A	85	00	00	F1	The host sets the rainfall status output of the module to be disabled
Host→Slave	3A	05	00	00	24	The host reads the rainfall status output frequency from the module
Host←Slave	3A	85	xx	xx	xx	The module sends the rainfall status output frequency to the host
Host→Slave	3A	85	0A	00	1F	The host sets the rainfall status output frequency of the module to 10
Host←Slave	3A	82	05	00	65	The module sends the error of parameter writing failure to the host

1.2.7 Set Rainfall Detection Sensitivity

The sensitivity of the rainfall detection is adjustable and all adjustable parameters are as shown in Table 1.11. By changing the parameters, the obtained rainfall status can be different under the same rainfall conditions. For example, under the same rainfall conditions, after increasing sensitivity, the module may output a rainfall status of

heavy rain, while by decreasing it, the output may change to light rain .

Note: Parameters V, S, N, frequency and calibration will be saved to internal Flash during configuration, so it is necessary to ensure a stable power supply.

Table 1.11 Commands Related to Rain Detection Sensitivity Parameter

Command Direction	Command Content (HEX)	Command Description
Host→Slave	3A 86 xx xx xx	The host sets no-rain/light-rain threshold V1 of the module
Host→Slave	3A 86 xx xx xx	The host reads no-rain/light-rain threshold V1 from module
Host←Slave	3A 06 00 00 EE	The module sends no-rain/light-rain threshold V1 to the host
Host→Slave	3A 86 xx xx xx	The host sets light-rain/moderate-rain threshold V2 of the module
Host→Slave	3A 87 xx xx xx	The host reads light-rain/moderate-rain threshold V2 from module
Host←Slave	3A 07 00 00 A8	The module sends light-rain/moderate-rain threshold V2 to the host
Host→Slave	3A 87 xx xx xx	The host sets moderate-rain/heavy-rain threshold V3 of the module
Host→Slave	3A 88 xx xx xx	The host reads moderate-rain/heavy-rain threshold V3 from module
Host←Slave	3A 08 00 00 19	The module sends moderate-rain/heavy-rain threshold V3 to the host
Host→Slave	3A 88 xx xx xx	The host sets no-rain/light-rain threshold S1 of the module
Host→Slave	3A 89 xx xx xx	The host reads no-rain/light-rain threshold S1 from module
Host←Slave	3A 09 00 00 5F	The module sends no-rain/light-rain threshold S1 to the host

续上表

Command Direction	Command Content (HEX)	Command Description
Host→Slave	3A 8A xx xx xx	The host sets light-rain/moderate-rain threshold S2 of the module
Host→Slave	3A 0A 00 00 95	The host reads light-rain/moderate-rain threshold S2 from module
Host←Slave	3A 8A xx xx xx	The module sends light-rain/moderate-rain threshold S2 to the host
Host→Slave	3A 8B xx xx xx	The host sets moderate-rain/heavy-rain threshold S3 of the module
Host→Slave	3A 0B 00 00 D3	The host reads moderate-rain/heavy-rain threshold S3 from module
Host←Slave	3A 8B xx xx xx	The module sends moderate-rain/heavy-rain threshold S3 to the host
Host→Slave	3A 8C xx xx xx	The host sets the module threshold N1 for the number of times of heavy rain in 10 measurements
Host→Slave	3A 0C 00 00 30	The host reads from module the threshold N1 for the number of times of heavy rain in 10 measurements
Host←Slave	3A 8C xx xx xx	The module sends to the host the threshold N1 for the number of times of heavy rain in 10 measurements
Host→Slave	3A 8D xx xx xx	The host sets the module threshold N2 for the number of times of moderate rain in 10 measurements
Host→Slave	3A 0D 00 00 76	The host reads from module the threshold N2 for the number of times of moderate rain in 10 measurements
Host←Slave	3A 8D xx xx xx	The module sends to the host the threshold N2 for the number of times of moderate rain in 10 measurements
Host→Slave	3A 8E xx xx xx	The host sets the module threshold N3 for the number of times of light rain in 10 measurements
Host→Slave	3A 0E 00 00 BC	The host reads from module the threshold N3 for the number of times of light rain in 10 measurements
Host←Slave	3A 8E xx xx xx	The module sends to the host the threshold N3 for the number of times of light rain in 10 measurements

The software algorithm of the module measures rainfall through three parameters: V, S and N. Each parameter corresponds to thresholds for three rainfall states. Change the

threshold to adjust the rainfall detection sensitivity.

Parameter V: the active degree of the dynamic raindrop flowing on the glass surface, the faster the raindrop flow, the larger the parameter V.

Parameter S: the "unevenness" of the static raindrop distributed on the glass surface, the higher the unevenness degree, the larger the parameter S.

Parameter N: The module will obtain the real-time rainfall status first according to the parameter V and S, and then determine the rainfall status as light rain, moderate rain, or heavy rain in 10 measurements, and finally output the rainfall status with most times through UART.

The thresholds for light, medium and heavy rain under different scenarios can be set as per actual requirements. For example, if you use a watering can to simulate rain detection, it is recommended to use initial parameter values of: V1=30, V2=1000, V3=2000; S1=100, S2=800, S3=1200; N1=2, N2=2, N3=2. When adjusting the parameters, it is required that V, S, and N conform to the following logical relationships.

- V1<V2<V3;
- S1<S2<S3;
- N3>=N1;
- N3>=N2

If you want to improve the sensitivity, reduce these parameters appropriately; if you want to reduce it, increase parameters appropriately. It is recommended to simulate raining conditions while debugging.

1.2.8 Real-time Rainfall Mode

The module supports the output of raw rainfall values and the related commands and operations are as shown in Table 1.12. At this time rainfall status cannot be sent.

Table 1.12 Real-time Rainfall Mode Commands

Command Direction	Command Content (HEX)					Command Description
Host→Slave	3A	84	01	00	43	The host commands the module to enter real-time rainfall mode
Host→Slave	3A	84	00	00	B7	The host commands the module to exit real-time rainfall mode
Host←Slave	3A	84	xx	xx	xx	The module sends raw rainfall values to the host

1.3 Ambient Light Detection Function

The module supports ambient light (white light) detection, which can be used with rainfall detection function. The operation commands are as shown in Table 1.13. Control the module to enter ambient light detection function, when the function is enabled, the ambient light value will be output at a fixed frequency. The ambient light feedback value range(decimal) is 0 ~ 1024. And the higher the light intensity, the lower the feedback value, or vice versa. Currently, there is no correlation curve for light intensity-vs.-feedback value.

Table 1.13 Ambient Light Mode Commands

Command Direction	Command Content (HEX)					Command Description
Host→Slave	3A	8F	01	00	DB	The host commands the module to enter ambient light detection mode
Host→Slave	3A	8F	00	00	2F	The host commands the module to exit ambient light detection mode
Host←Slave	3A	83	xx	xx	xx	The module sends ambient light value to the host

1.4 Temperature Detection Function

The module supports ambient temperature detection function, which is implemented by the integrated on-chip temperature sensor. As shown in Figure 1.2, the measured ambient temperatures range from -40°C to 85°C with a stepping of 5° C and they have good linearity. In the calculation formula, y represents the temperature value from RS200 feedback(it's hexadecimal in RS200 feedback, and decimal in the calculation formula); x represents the ambient temperature. The commands and descriptions are as shown in Table 1.14.

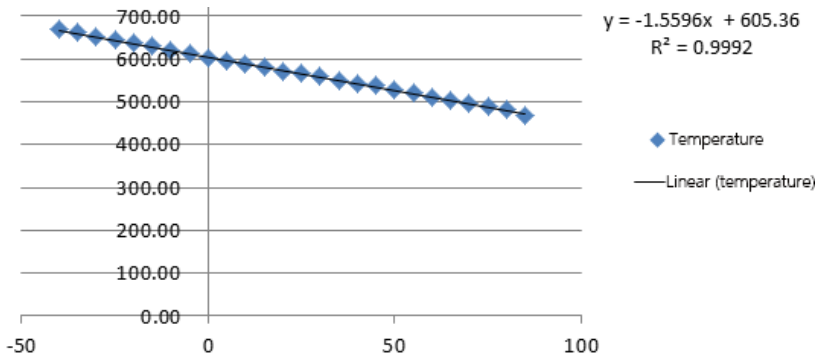

Figure 1.2 Temperature Detection Linearity Analysis

Table 1.14 Temperature Detection Commands

Command Direction	Command Content (HEX)	Command Description
Host→Slave	3A 10 00 00 EF	The host reads chip temperature from the module
Host←Slave	3A 90 xx xx xx	The module sends chip temperature to the host

1.5 Sleep Function

The module supports low-power sleep mode. When the module enters the low-power mode, it will disable all rain detection functions and will only respond to specific wake-up frame. The relevant commands and descriptions are as shown in Table 1.15.

Table 1.15 Sleep Function Commands

Command Direction	Command Content (HEX)	Command Description
Host→Slave	3A 91 00 00 7C	The host commands module to enter sleep mode
Host→Slave	3A 91 01 00 88	The host commands module to exit sleep mode
Host←Slave	3A 12 00 00 63 3A 80 00 02 FC	The module sends Boot command and firmware version command to host

2. Operation Description

2.1Interface Description

The module uses a 0.8mm wire-to-board socket to lead out the power supply and communication pins for easy use, as shown in Figure 2.1. The communication pins are 2-wire serial ports that can communicate with the host directly and send rainfall status data, and the pin definition is shown in Table 2.1.

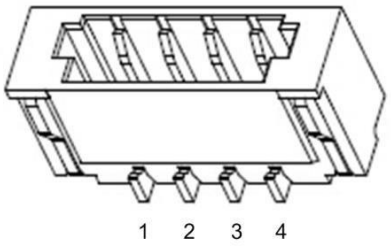

Figure 2.1 Wire-to-Board Socket

Table 2.1 Pin Definition

NO.	Signal Name	Function	Remarks
1	VCC	3.3V Power Supply	-
2	UART_TX	UART Receiving	Connect to the pin TX of the host UART
3	UART_RX	UART Transmitting	Connect to the pin RX of the host UART
4	GND	Ground	-

2.2 Use Guide

2.2.1 Installation

The mechanical dimensions of the RS200 are shown in Figure 2.2. There is a ring with a width of 0.5 mm (no components inside the ring) on the outermost circle of the PCB to help the host mechanic structure fix the RS200 module.

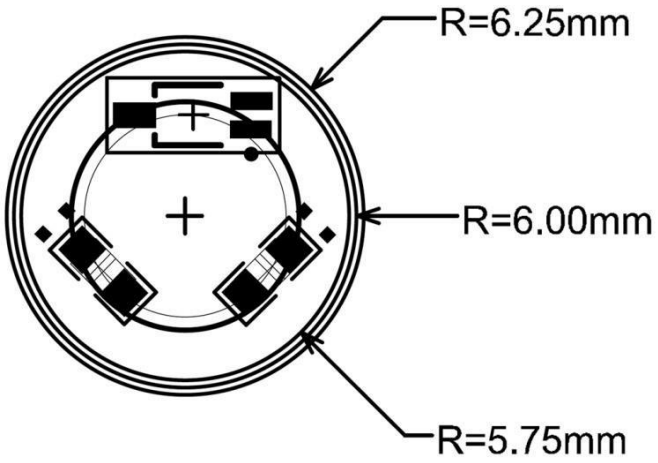

Figure 2.2 Dimensions on the Front Side

First, fix the module on the host mechanic structure with the front side (the side with the IR emitter) facing the glass; then, place the flexible transparent optical material on the front side of the module; finally, put the glass lid on and the installation is done.

There are two requirements during installation:

1. The flexible transparent optical material needs to wrap tight the "IR emitter", "photoelectric receiver", and be pressed against the "inner surface of the glass". Give appropriate pressure to eliminate air to avoid air bubbles.

2. The **typical distance** from the module "PCB surface" to the "glass outer surface" is 4.0mm (adjustable), and the thickness of the glass and the flexible transparent optical material can be adjusted appropriately. For example, if the glass thickness is 1.5 mm, the thickness of the filled flexible transparent optical material should be 2.5 mm; if the glass thickness is 2.0 mm, the thickness of the filled flexible transparent optical material should be 2.0 mm. The distance is limited by the host structure because the flexible transparent optical material is highly susceptible to deformation.

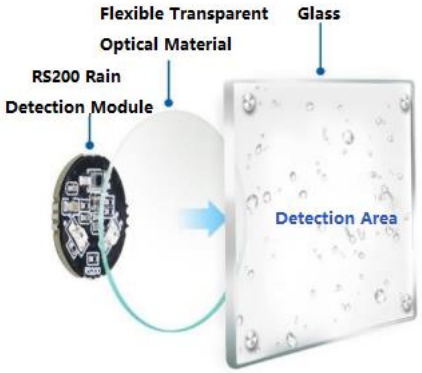

Figure 2.3 Side View of Module Installation Layers

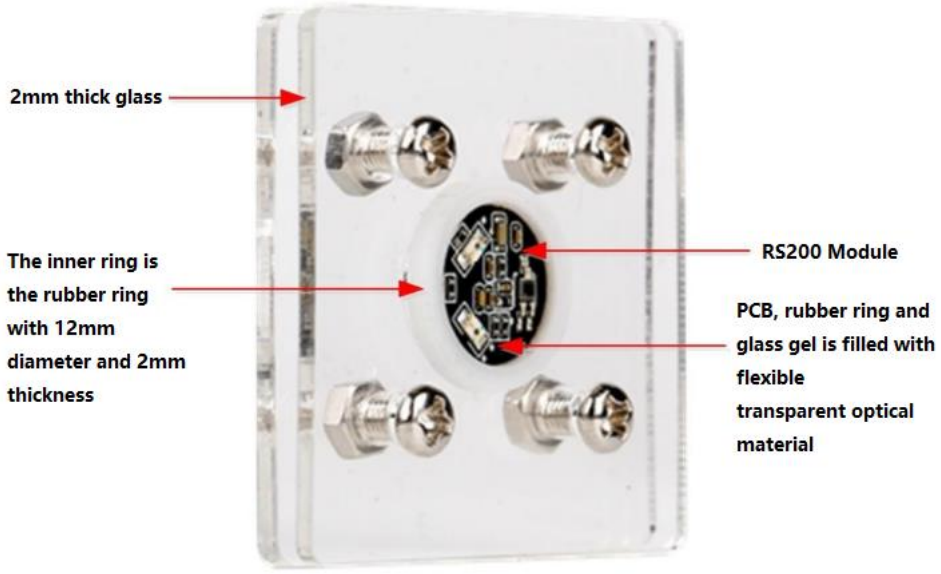

Figure 2.4 Final Installation Effect

2.2.2 Wire Connection

Connect the module to the camera host controller through the dedicated wire, power the module with 3.3V power supply, and connect UART.

2.2.3 Perform Optical Calibration

After the first installation, it is required to perform optical system calibration for the module to ensure the accuracy of rain detection. Calibration steps:

1. Ensure the external surface of the glass is clean, dry and free from foreign matters, and it is recommended to calibrate in a dark room to keep the calibration free from interference of light.

2. According to the commands listed in Table 1.9, the host sends to the module an automatic calibration command: "3A 83 00 00 54". After the module receives it, it will automatically perform optical system calibration and send the calibration result to the host. The result will be written into Flash so there is no need to calibrate again after power on. If the host receives the command "3A 82 04 00 91" for unsatisfactory optical system calibration, it means that the optical path asymmetry of the optical system is beyond the adjustable range due to the mechanical structure and installation accuracy, which reduces the module' s ability to resist sunlight interference, thus leading to misjudgment.

During use, if the optical system changes, perform the optical system calibration again as per needs.

2.2.4 Initialize Module to Read Rainfall Status & Control Wiper

After the first calibration, the module can be used without initialization if there is no special requirements. The host can control the wiper according to the rainfall status automatically reported by the module. If you have special needs, you can adjust the rainfall status output frequency according to Table 1.10, adjust the rain detection sensitivity according to Table 1.11, etc. The adjustable parameters such as calibration value, V, S, N and frequency are saved when powered off, so there is no need to reconfigure them every time you power on.

3. System Failures

3.1 Command Failures

The module will automatically monitor the system status during operation, and if there is any system error, the module will send the system error to the host. The descriptions of various abnormal phenomena are shown in Table 3.1.

Table 3.1 Descriptions of Abnormal Phenomena

Abnormal Phenomena	Description
Internal communication error of the module	The chips of the module can't communication normally.
LEDA damaged	If the read rainfall value is invalid, LEDA may be damaged
LEDB damaged	If the read rainfall value is always 0, LEDB may be damaged
Optical system calibration not good	After calibration, the absolute value of no-rain rainfall value minus 255 is too larger
Optical system parameter writing failure	An error occurred or the output parameter is out of the specific range while writing non-volatile memory to Flash of MCU
Check error of received serial data	The module received a host command check error, and the command will not be executed by RS200
Low voltage warning	The module voltage is no more than 2.8V

4. FAQ

1. Q1: How much does the sunlight in night-time and day-time environments affect the rain detection sensitivity and accuracy? What’ s the purpose of optical calibration?

A1: There is no effect, because the module uses HALIOS®-SD patented technology that can reduce the influence of sunlight on the module; optical calibration can eliminate the optical path asymmetry caused by problems like components, module production and installation tolerance.

2. Q2: Is there any environment requirement or any specific operation method for performing optical calibration?

A2: Please refer to chapter 2.2.3 for calibration steps.

3. Q3: Does strong light illumination on the product affect the module’ s performance or cause false triggering?

A3: There is no effect under symmetrical optical conditions. For one measurement period, the ambient light can be considered as a stable background value. There is a very small probability that the ambient light varies much within the same period.

4. Q4: What are the EMC and EMI levels of the module?

A4: ESD: ±8K; temperature range: -40~85℃; alternating humid heat: 25~60℃, 45%~95%RH.

5. Q5: What is the recommended thickness of the glass board?

A5： The recommended distance from the glass outer surface to the "front side" of the PCB is 4mm, and the thickness of the glass can be changed within the range.

6. Q6: Can I set the sensor to automatically upload data when it detects a change in rainfall status?

A6: Sorry, you can't. As described in chapter 1.2.3, when the rainfall status output frequency is disabled, send command"3A 01 00 00 0D" to query the rainfall status; when it is not disabled, the rainfall status will be fed back immediately, and return nothing for no rain.

7. Q7: What kind of value will be output when the module detects real-time rainfall, real-time light, and real-time temperature?

A7: The values generated in these modes are the raw data directly output by the sensor. There is no correlation curve for raw rainfall data and ambient light data, and the temperature data can be calculated according to the formula in Figure 1.2.