SH2 Series

Hardware Manual

Introduction

Thank you for purchasing SSZN high-speed camera system "**SH2 series**" (hereinafter referred to as the System).

This manual contains the operating instructions and warnings required to use the System. Before using the System, please read the entire manual. If there are any unclear information in this manual, please contact SSZN using the contact information printed on the back of the manual.

After reading the manual, please store it associated with the warranty card in a safe place and review it if necessary.

Instruction Manual

Overview of the manual

● Introduction
This chapter provides an overview of the manual and safety precautions.

● **Chapter 1** - Settings
This chapter provides an overview of the various components that make up the system.

● **Chapter 2** - Specification
This chapter provides an overview of the system's specifications.

● **Chapter 3** - Warranty
This chapter provides an overview of warranty.

● **Chapter 4** - Contact SSZN
This chapter lists the contact information that should be used to contact SSZN when there is a system malfunction or when certain parts of the manual are unclear.

Symbols

The symbols used in this manual have the following meanings.

Icons / Symbols	Description
IMPORTANT	This symbol indicates what should always be read.
CAUTION	This symbol indicates instructions that should always be followed when using the software, or things to keep in mind when using the software.
NOTE	This symbol indicates something that requires additional attention when using the system.
REFERENCE	This symbol indicates the reference position.
" "	This quotation mark is used to indicate the name of the item on the screen, the reference, the dialog box name and the connector.
[ ]	This square bracket is used to indicate a menu name or a sub-menu name.

Safety and Proper Usage Instructions

To avoid harm to yourself and others, as well as damage to property, please carefully follow the following safety precautions.

SSZN has given full attention to the security of this system. However, ignoring the content of safety precautions and using this system incorrectly may result in potential losses and injuries, which will be explained below. Please pay careful attention to the safety precautions when using this system.

⚠ **Warning**	This symbol represents actions that may cause harm to people. Serious injury.

⚠ **Attention**	This symbol represents actions that may cause harm to people. May cause moderate injury or damage to physical property.

● The safety precautions to be followed are indicated by the following symbols.

⚠	The symbol indicates the need for cautious action.

❗	The symbol indicates that attention must be paid.

🚫	The symbol indicates actions that are prohibited and must be avoided.

⚠️ **Warning**

- ■ Do not do anything that will damage the cable or plug.

  (Do not damage the cable, do not modify the cable, do not use the cable near the heater, do not excessively bend, twist or pull the cable, do not place heavy objects on the cable, and do not bind the cable).

  Using damaged cables may lead to fire, electric shock, or short circuits.

- ■ Do not use power sources that exceed the rated value for power supply.

  Exceeding the rated power may cause a fire due to overheating.

- ■ Do not insert metal objects into the system or pour liquids such as water into the system.

  To prevent fire, electric shock, or malfunctions caused by short circuits or heating.

- ■ Do not disassemble or modify the system.

  There is high voltage in the system, which may cause electric shock.

- ■ Do not touch any conductive object with your hands when inserting or removing the power cord.

  It may cause electric shock.

- ■ Ensure that the power plug is fully inserted into the socket.

  Not fully plugging in the power cord may cause a fire due to electric shock or heat.

- ■ When there is a problem with the system, the power cord should be immediately unplugged.

  - When foreign substances or liquids, such as metals or water, enter the system.
  - When the outer box is damaged, such as due to falling.
  - When the system emits smoke, strange odors, or strange sounds.

  Using the system in these situations may lead to fire or electric shock.

- ■ Do not use accessories for purposes not specified by the manufacturer.

  It may cause damage to camera components of the system.

⚠ **Notes**

■ When cleaning the system or not in use for a long time, be sure to unplug the power cord.

   Connecting or keeping the system to a power source may cause a fire due to a decrease in insulation performance and discharge.

■ When you are using laser or direct light, please consult us in advance.

■ Do not place the system in areas with extremely high temperatures.

   It may cause changes in the properties of the casing or internal components or cause a fire.

■ Do not place the system in areas that are prone to producing oil fumes or steam, or in areas with a large amount of dust.

   Oil, moisture, and dust can conduct electricity and may cause fire or electric shock.

■ Work environment requirements: temperature -10~50℃, humidity ≤ 95% RH, no icing, no condensation.

■ Storage environment requirements: temperature -20~60℃, no condensation.

■ During transporting, please remove the connecting cable and use the original packaging or a dedicated suitcase.

   Do not transport the system in environments with temperatures below -20℃ or above 60℃. Additionally, it is important to prevent the condensation during transportation.

⚠ **Clean the Surface of the Image Sensor**

Electrostatic discharge (ESD) events may cause direct and irreversible damage to image sensors.

Please read the following instructions and be extra careful when cleaning the surface of the image sensor.

- Always take appropriate anti-static precautions when cleaning or working near image sensors.

- Do not use any form of cleaning tools that uses electrostatic or "charged fiber" technology.

- Before working near the camera sensor, please release any static electricity accumulation in your body by touching the grounded metal surface.

- Please clean the dust on the surface of the image sensor in a dry environment.

- To remove stubborn pollution, use pure Isopropyl Alcohol (IPA) in the highest grade (such as in VLSI grade) and an optical wiping cloth in "dust-free room" grade.

- Special care must be taken by gently wiping the entire sensor in one go.

- Do not rub to avoid abrasive damage to the fragile optical coating on the glass surface.

Contents

1

Chapter 1 Settings

This chapter provides an overview of the various components that make up the system.

1.1. The Components and Accessories of the System

1.2.1.　Components

Please refer to the attached packaging list for the standard components and accessories of this product.

> **NOTE**
>
> This system does not include a lens.

1.2.2.　Accessories

The system has the following accessories.
1. Dedicated suitcase
2. Network cables and power adapter
3. DAQ options
4. USB flash drive (FastPhoto software installation package and related manuals)

> **NOTE**
>
> Lens, lighting equipment, and other types of options are available.
> Please contact our sales representative or distributor. Please refer to "4.1 Contact Information".

> **!** Only use the components and accessories specified in "1.1 The Components and Accessories of the System", such as AC power adapters/AC cables, and others.

1.2. Component Name

The system consists of components such as the camera, power adapter, and SSZN FastPhoto control software.

🚫 **Cautions for camera and AC power adapter**

- ■ Do not expose the camera, AC power adapter, and other optional components to impact.

- ■ Do not use in areas with flammable gases or dust.

- ■ Do not place it in unstable places, such as unstable platforms or slopes.

- ■ Do not disassemble or modify the product.

- ■ Do not expose the products to liquids such as water.

1.2.1   Camera body

The camera body contains an IC memory for image recording and is designed to record uncompressed high-speed images. Gigabit/10G Ethernet interface, allowing for comprehensive control and data download of cameras through connection to a PC; Input/output connectors include interfaces that allow external synchronization signals, trigger input/output signals, and input IRIG-B (AC) code.

1.2.2   Name of Camera Parts

SH2 series camera is equipped with two kinds of mount.

Lens C mount

C mount: at the front of the camera

Lens E mount

E mount: at the front of the camera

SDI:
video output

POWER LINK TRIG/SYNC SYSTEM ERROR

SDI

I/O

PWR/NET
DC-IN ⎓ 20-32V

I/O:
includes input/output trigger signals, input/output sync. signals, input IRIG-B signals, and input/output RS422 signals.

PWR/NET:
Power input / Network communication
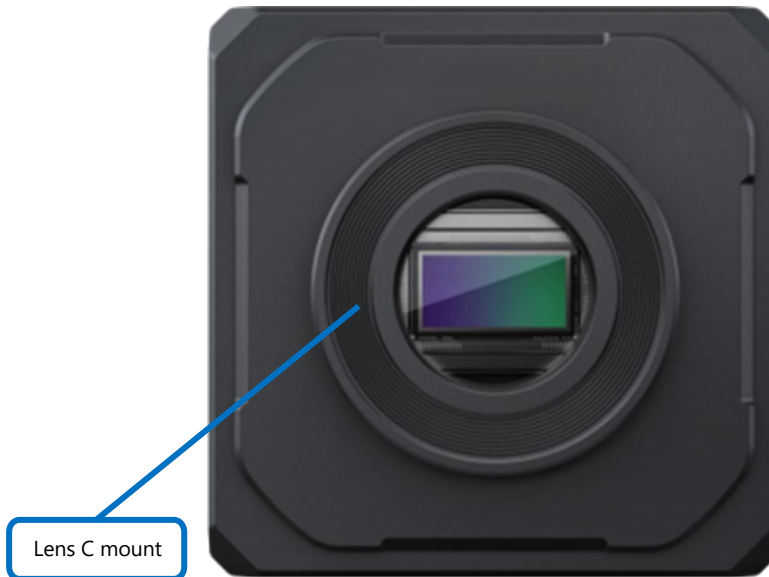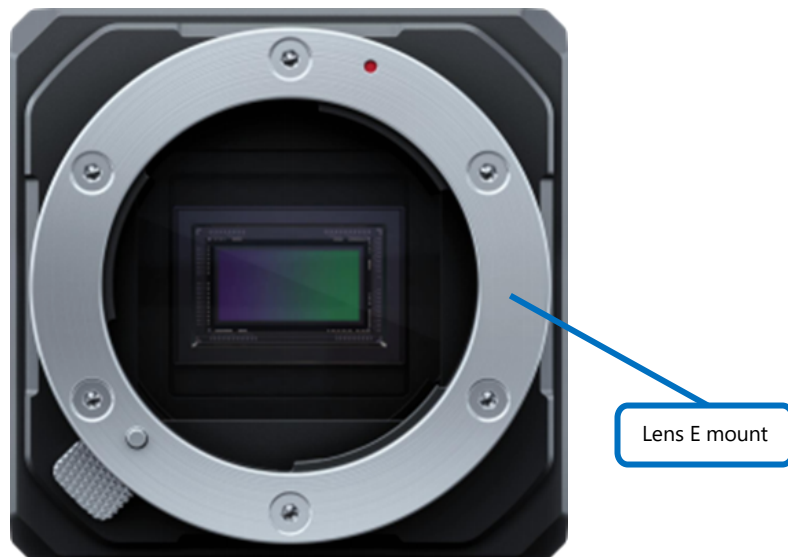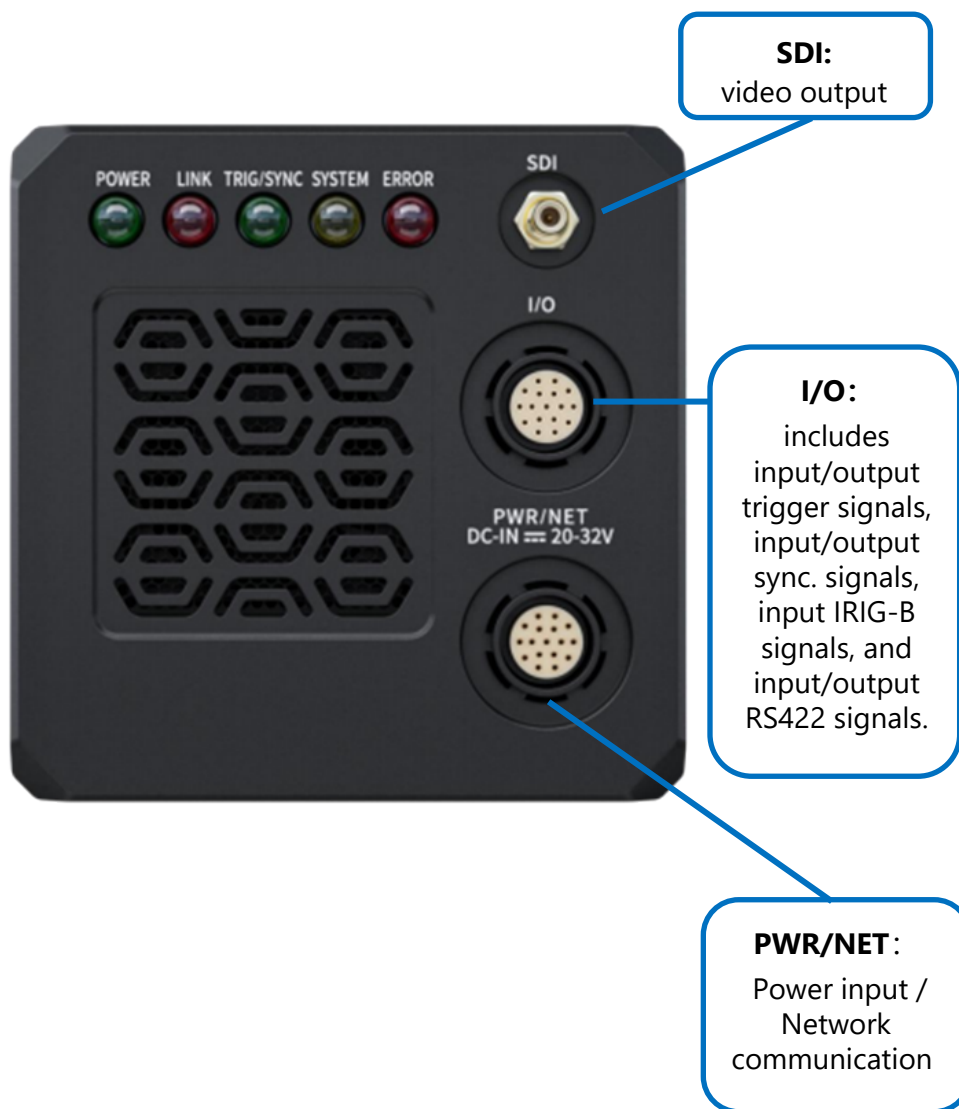
1.2.3. Accessory Lens Mount Adapter

As shown in the picture, the lens mount on the "SH2 series" E-mount camera can be equipped with a mount adapter (such as E-to-F port, E-to-C port, etc.) according to the purpose.

F-E Mount Adapter

1.2.4. The Status Indicator LED on the Back of the Camera

There are a row of indicator LEDs behind the camera. These LEDs display the status of the camera.

Purpose of LEDs	LED Status	Status
Power	On	Power on
	Off	Input voltage too low or faulty
LINK (network)	On	Normal network connection
	Off	Abnormal network connection
TRIG/SYNC	On (Flash once)	Camera trigger
	Off	No camera trigger
SYSTEM(running status)	On	In recording
	Off	Not in recording (preview/playback/pause)
ERROR (Error alarm)	On	Alarm to camera working
	Off	No alarm to camera working

1.3. PWR/NET Interface

The camera power input interface can be connected with the AC power adapter in the product accessories or with a DC power supply (such as a UPS power pack).

When using other power sources, please strictly refer to the pin diagram below to construct the cable.

Function: Power input, network communication

Power voltage: DC20~32V

Power comsuption: 25W

Ethernet: 10 Gigabit
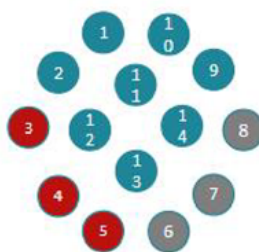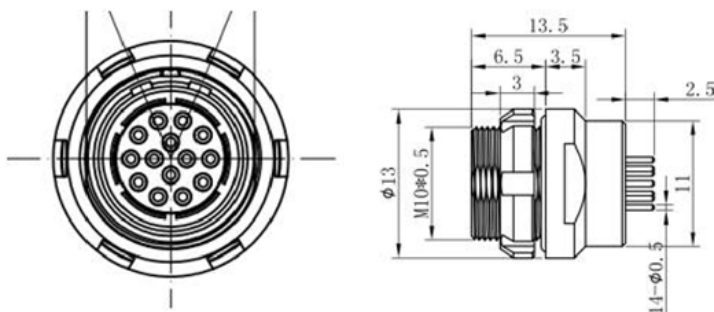
Top View

PIN NO.	Name	Input/Output	Description	Remark
1	TRX2+	IO	10G Ethernet	
2	TRX2-	IO	10G Ethernet	
9	TRX0-	IO	10G Ethernet	
10	TRX0+	IO	10G Ethernet	
11	TRX1-	IO	10G Ethernet	
12	TRX1+	IO	10G Ethernet	
13	TRX3+	IO	10G Ethernet	
14	TRX3-	IO	10G Ethernet	
3,4,5	VIN DC 20-32V	I	Power input	
6,7,8	GND	I	Power input grounding	

1.4. I/O Interface

This camera can be input and output through an I/O cable, and the signals that can be input and output from the I/O cable are as follows.

Function: extended input/output control signals

Top View

Mark point
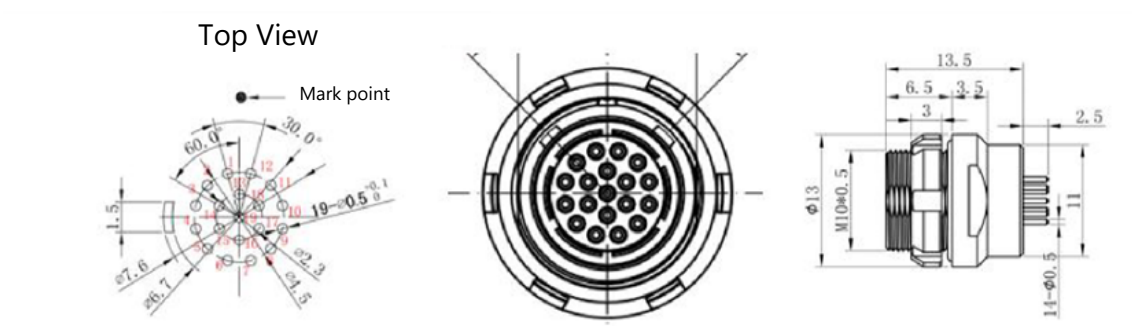
Do not input signals other than the specified ones into each connector.

Be particularly careful when using, as there is a risk of damage to both input and output devices.

REFERENCE

Please refer to "10.4 I/O Settings" in the "FastPhoto User Manual" for detailed settings.

The following are I/O connectors and related signals.

1.4.1. TRIG -IN (AC) Input Interface

Convert to standard BNC connector through I/O adapter cable.

Function: TRIG signal input

Interface type: BNC connector

TRIG Input	**Signal Logic Level:** 3~10Vpp, input impedance of approximately 110ohm, isolated transformer input. **Code format:** IRIG-B (122) analog **Token and spatial ratio:** 3:1 to 6:1 **Typical modulation/carrier signal ratio:** 10:1
	Function: The system supports the input of IRIG-B codes and can add IRIG time codes to each frame record.

> ### NOTE
>
> - IRIG time codes are used to synchronize the camera with external devices in terms of time. This is a very practical feature when the devices are physically separated.
> - When inputting the IRIG code, "IRIG" will display on the right of the current time, and if not, it is the system time.
> - To use IRIG-DC signal for input, please set the input of DC signal in "INPUT (1,2,3)".

1.4.2.   INPUT (1,2,3) Input Interface

Convert to standard BNC connector through I/O adapter cable.
Pull-up or pull-down mode can be configured by software, and the default is pull-up mode.
The input voltage is 0V to +5V (+3.3V to +5V for high logic level), and the positive and negative pulse width is 100ns or greater.
The default settings are as follows:
INPUT1 connector is designated as "SYNC POS"
INPUT2 connector is designated as "TRIG POS"
INPUT3 connector is designated as "READY POS"

Menu Display	Function	Signal (Input signal conditions)
SYNC POS	Input a positive polarity trigger signal Control the input signal of the camera frame triggering (Note: it needs to be set to "External" in the trigger settings)	FET input 0V to +5V (+3.3V to +5V for high logic level), positive polarity
SYNC NEG	Input a negative polarity trigger signal Control the input signal of the camera frame triggering (Note: it needs to be set to "External" in the trigger settings)	FET input 0V to +5V (+3.3V to +5V for high logic level), negative polarity
TRIG POS	Input a positive polarity trigger signal Control the signal for the camera to enter recording from ready state.	FET input 0V to +5V (+3.3V to +5V for high logic level), positive polarity
TRIG NEG	Input a negative polarity trigger signal Control the signal for the camera to enter recording from ready state.	FET input 0V to +5V (+3.3V to +5V for high logic level), negative polarity
READY POS	Input a positive polarity READY signal. Control the signal for the camera to enter Ready state.	FET input 0V to +5V (+3.3V to +5V for high logic level), positive polarity
READY NEG	Input a negative polarity READY signal. Control the signal for the camera to enter Ready state.	FET input 0V to +5V (+3.3V to +5V for high logic level), negative polarity
IRIG DC	Input a standard IRIG-B (DC) digital signal The IRIG-B (B002/B122) DCLS signal can add an IRIG code to each frame of the recorded image.	FET input 0V to +5V (+3.3V to +5V for high logic level), positive polarity

1.4.3. INPUT (1,2,3) Output Interface

Convert to standard BNC connector through I/O adapter cable.
Standard BNC connector, output voltage from 0V to+5V, positive and negative polarity, pulse width can be changed, minimum 100ns.
The default settings are "SYNC POS" for OUTPUT1 and "TRIG POS" for OUTPUT2.
The output signal effect is described as follows:

Menu Display	Function	Signal (Input signal conditions)
SYNC POS	Output a positive polarity sync. signal. The frequency of this signal is equal to the frame rate of the camera.	Signal logic level: CMOS Level, 5V
SYNC NEG	Output a negative polarity sync. signal. The frequency of this signal is equal to the frame rate of the camera.	Signal logic level: CMOS Level, 5V
TRIG POS	Output a positive polarity trigger signal. The camera enters recording output signal from Ready.	Signal logic level: CMOS Level, 5V
TRIG NEG	Output a negative polarity trigger signal. The camera enters recording output signal from Ready.	Signal logic level: CMOS Level, 5V
READY POS	Output a positive polarity READY signal. Output signal when the camera is ready.	Signal logic level: CMOS Level, 5V
READY NEG	Output a negative polarity READY signal. Output signal when the camera is ready.	Signal logic level: CMOS Level, 5V
IRIG DC	IRIG-B DCLS signal output (this signal can only reproduce IRIG-B code signals, and the camera itself cannot generate such a signal) IRIG-B (B002/B122)	Signal logic level: CMOS Level, 5V
EPO POS	Output a positive polarity signal. Camera frame trigger output signal (pulse width controlled by shutter).	Signal logic level: CMOS Level, 5V
EPO NEG	Output a negative polarity signal. Camera frame trigger output signal (pulse width controlled by shutter).	Signal logic level: CMOS Level, 5V

1.4.4. RS422 Input Interface

Convert to standard BNC connector through I/O adapter cable.
Function: RS422 data transmission

1.4.5. RS422 Output Interface

Convert to standard BNC connector through I/O adapter cable.
Function: RS422 data reception

1.4.6.   Input/output Circuit Diagram

INPUT·
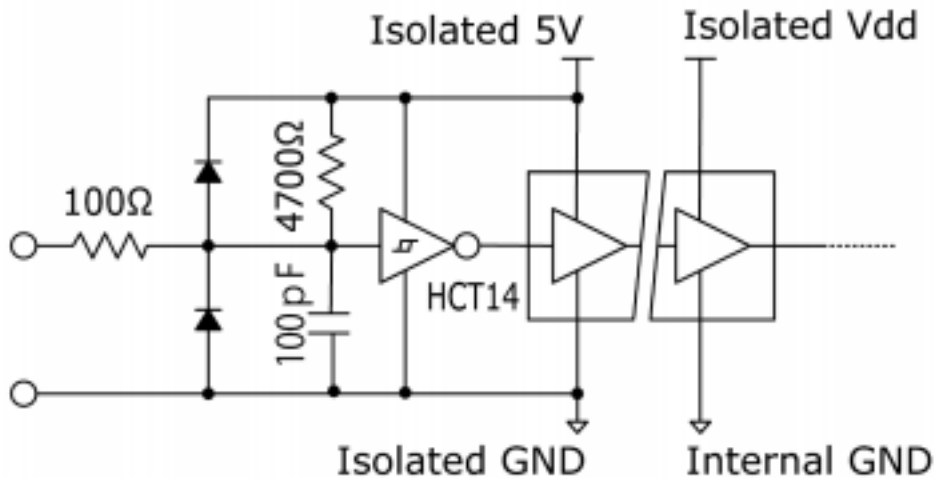
Supports TTL signal, 5V pull-up resistor 4700 Ω, low logic level: -0.5 to +0.5V, high logic level: 3.5 to 5V.

OUTPUT:
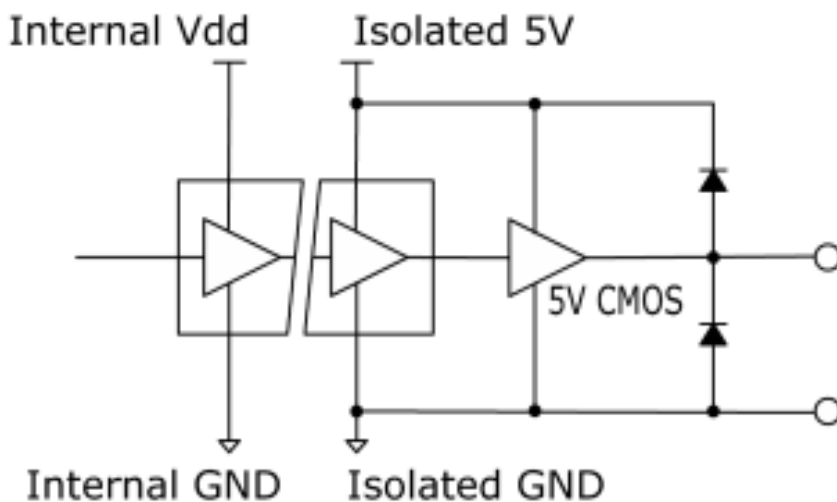
5V CMOS, low logic level below 0.5V, high logic level above 3.5V, current ⩽ ± 4mA, default to high logic level output, with polarity reversal function.

1.4.7.   Input/output and Synchronous Output Parameter Settings

Through this system, you can set signal delay time (filtering) or pulse width for various input and output signals.

For detailed settings, please set the parameters in the FASTPHOTO software - IO settings.

Input filtering

Set filter input pulse width for each INPUT (1,2,3) interface, with a range of 0-6553.5µs

TRIG OUT settings

 Output mode:

Center: Record the signal at the center output of the next frame.
Through: Immediately output the signal
Ready And Trigger: This signal will be output when entering Ready and Recording.
Delay: Starting from the current trigger frame, a delay can be set to output the recording signal.

Delay: Only effective when the output mode is Delay, with a range of 0-6553.5µs.
Pulse width: Set the output pulse width, ranging from 0 to 6553.5µs.

SYNC OUT settings

Multiplication: Set the square wave signal multiplication frequency of SYNC OUT, with a range of 0.5, 1, 2, 4, 8.
Delay: Output signal delay range, between 0-1/frame.
Pulse width: The output pulse width, ranging from 0 to 1/frame.

For a frame rate of 1000 frames, the multiplication is set to 2.

1,000 fps Synchronization Signal

SYNC OUT Output
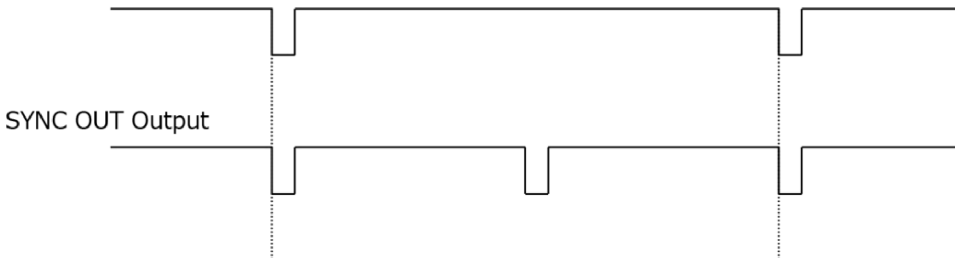
For a frame rate of 1000 frames, the synchronous output rate is set to 4.

1,000 fps Synchronization Signal

SYNC OUT Output
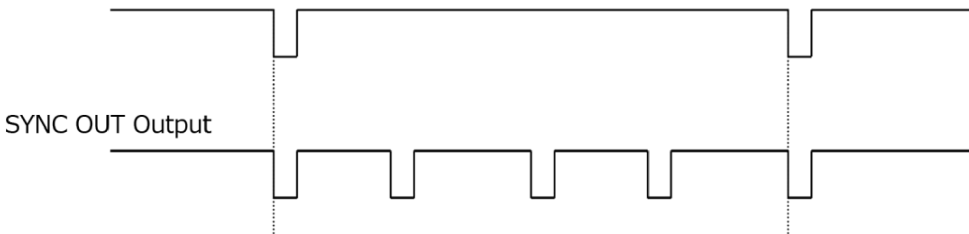
1.5. SDI Interface

Convert to standard BNC connector through I/O adapter cable.

Function: Monitoring video output interface

Interface type: SMA connector

SDI Output	Output signal: 3G-SDI
	Function: Image monitoring

1.6. Device Connection

1.6.1   The Least Device Connection

■   The least device connection for using a camera is as follows.
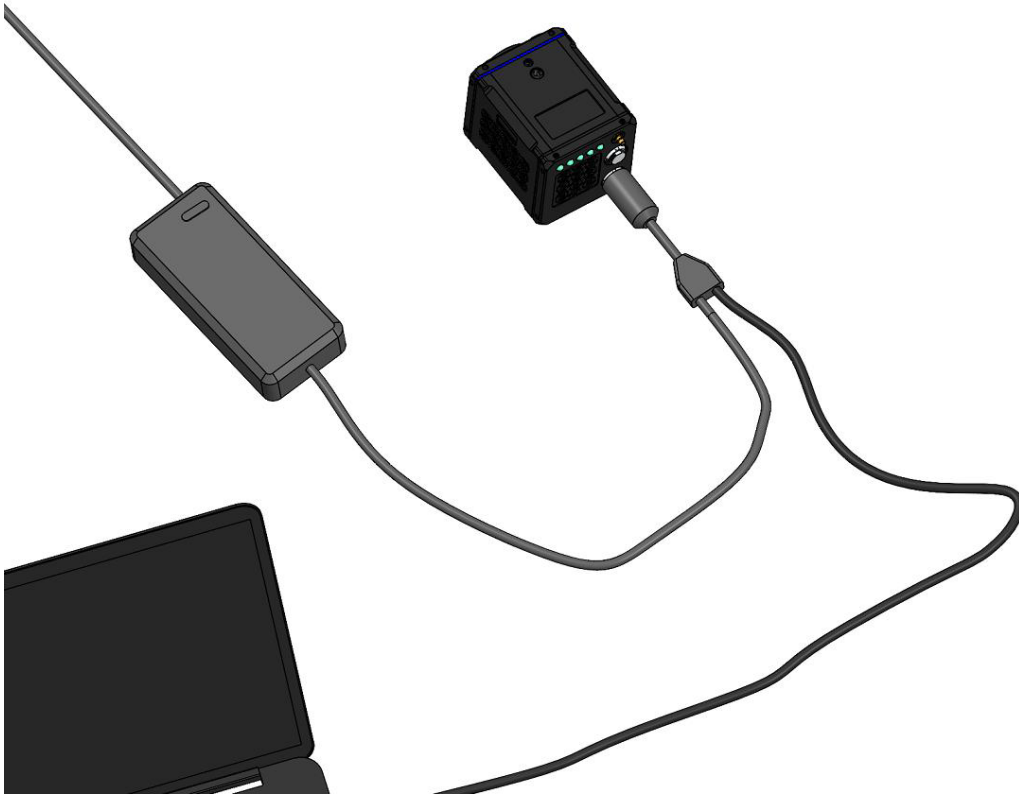
1. Network cable (the network cable attached to this product).

2. Power adapter (the accessory adapter of this product).

3. The computer needs to install the FastPhoto software package, and the computer network card needs to support 1Gb or 10Gb types.

1.6.2.　Connecting AC Power Supply

■　　　The least device connection for using a camera is as follows.

1. Connect the DC end of the power adapter to the "DC-IN (20-32V)" interface on the back of the camera.
2. Connect the AC end to the power outlet.

2

Chapter 2 Specifications

This chapter provides an overview of the system's specifications.

2.1. Specifications

2.1.1　Camera Type and Specifications

For SH2 series cameras, there are monochrome and color versions, each with standard memory options 16GB and 64GB, and high-capacity memory options 512GB/1TB/2TB. When purchasing, you can choose from these versions according to your application or your own requirements. The versions and specifications of each model are as follows.

SH2-201

Model	SH2-201
Max. Resolution	1920×1080
Full Frame Rate	1200fps
Maximum Frame Rate	110000fps
Minimum Exposure Time	100ns
Exposure Frame Interval	300ns
Cell Size	10μm
Standard RAM	16GB, 64GB, 1TB, 2TB (Optional)
Dynamic Range	60dB
Analog Gain	×2, ×4, ×8
Bit Depth	8bit/10bit/12bit
Shutte Mode	Global
Color	Monochrome (M) / Color (C)
ROI	Support
Lens Mount	E Port, adaptable to F Port, C Port, EF Port
Data Interface	10 Gigabit Ethernet, compatible with Gigabit Ethernet, 2.5G and 100Mbps
Sensitivity	ISO30000(M), ISO10000(C)
Fan Control	Support turning on / off. Level 1-5
Operating Temperature/Humidity	Standard -10~50℃, below 95%(no condensation), customizable -40~65℃ wide temperature range version
Recording Mode	Start, End, Center, Random, Manual
Trigger Mode	Manual, IO, Image
External Signal	Input: trigger (TTL/switch) signal, sync signal, trigger signal, IRIGB code signal, RS422. Output: trigger (TTL/switch) signal, sync signal, ready signal
Power Supply	DC 24V
Dimensions (excluding lens)	89D×72W×72H, excluding lens adapter or protrusion parts
Weight	730g (E mount), 680g (C mount)
Power Consumption	＜35W
Standard Accessories	Power cord×1, AC Adaptor×1, Network cable×1, Camera Control Software×1, Product Manual×1, Qualified Certificate×1

SH2-202

Model	SH2-202
Max. Resolution	1920×1080
Full Frame Rate	2200fps
Maximum Frame Rate	205000fps
Minimum Exposure Time	100ns
Exposure Frame Interval	300ns
Cell Size	10μm
Standard RAM	16GB, 64GB, 1TB, 2TB (Optional)
Dynamic Range	60dB
Analog Gain	×2, ×4, ×8
Bit Depth	8bit/10bit/12bit
Shutte Mode	Global
Color	Monochrome (M) / Color (C)
ROI	Support
Lens Mount	E Port, adaptable to F Port, C Port, EF Port
Data Interface	10 Gigabit Ethernet, compatible with Gigabit Ethernet, 2.5G and 100Mbps
Sensitivity	ISO30000(M), ISO10000(C)
Fan Control	Support turning on / off. Level 1-5
Operating Temperature/Humidity	Standard -10~50℃, below 95%(no condensation), customizable -40~65℃ wide temperature range version
Recording Mode	Start, End, Center, Random, Manual
Trigger Mode	Manual, IO, Image
External Signal	Input: trigger (TTL/switch) signal, sync signal, trigger signal, IRIGB code signal, RS422. Output: trigger (TTL/switch) signal, sync signal, ready signal
Power Supply	DC 24V
Dimensions (excluding lens)	89D×72W×72H, excluding lens adapter or protrusion parts
Weight	730g (E mount), 680g (C mount)
Power Consumption	＜35W
Standard Accessories	Power cord×1, AC Adaptor×1, Network cable×1, Camera Control Software×1, Product Manual×1, Qualified Certificate×1

SH2-203

Model	SH2-203
Max. Resolution	1920×1080
Full Frame Rate	3200fps
Maximum Frame Rate	300000fps
Minimum Exposure Time	100ns
Exposure Frame Interval	300ns
Cell Size	10μm
Standard RAM	16GB, 64GB, 1TB, 2TB (Optional)
Dynamic Range	60dB
Analog Gain	×2, ×4, ×8
Bit Depth	8bit/10bit/12bit
Shutte Mode	Global
Color	Monochrome (M) / Color (C)
ROI	Support
Lens Mount	E Port, adaptable to F Port, C Port, EF Port
Data Interface	10 Gigabit Ethernet, compatible with Gigabit Ethernet, 2.5G and 100Mbps
Sensitivity	ISO30000(M), ISO10000(C)
Fan Control	Support turning on / off. Level 1-5
Operating Temperature/Humidity	Standard -10~50℃, below 95%(no condensation), customizable -40~65℃ wide temperature range version
Recording Mode	Start, End, Center, Random, Manual
Trigger Mode	Manual, IO, Image
External Signal	Input: trigger (TTL/switch) signal, sync signal, trigger signal, IRIGB code signal, RS422. Output: trigger (TTL/switch) signal, sync signal, ready signal
Power Supply	DC 24V
Dimensions (excluding lens)	89D×72W×72H, excluding lens adapter or protrusion parts
Weight	730g (E mount), 680g (C mount)
Power Consumption	＜35W
Standard Accessories	Power cord×1, AC Adaptor×1, Network cable×1, Camera Control Software×1, Product Manual×1, Qualified Certificate×1

2.1.2. AC/DC Adapter

Manufacturer		Dongguan Gangqi Electronics Co., Ltd.
Type		GQ120-2400500-E4
Rating	Input	AC100-240V, 50-60Hz, Max. 2A
	Output	DC24V, 5.0A
Dimensions		153.5(L) x 66.2(W) x 32.35(H)mm, excluding protrusion parts
Weight		556g

2.2. Dimensions

2.2.1.　Dimensions of the Camera

The SH2 series high-speed camera has two specifications: C-mount and E-mount. The structual drawings are as follows:

SH2 Smart Series High-speed Camera (C Mount)

Design	Liu Yu	Review		View	Size	Scale
Date		April 16, 2024			A4	1:2

SH2 Smart Series High-speed Camera (E Mount)

Design	Liu Yu	Review		View	Size	Scale
Date		April 16, 2024			A4	1:2
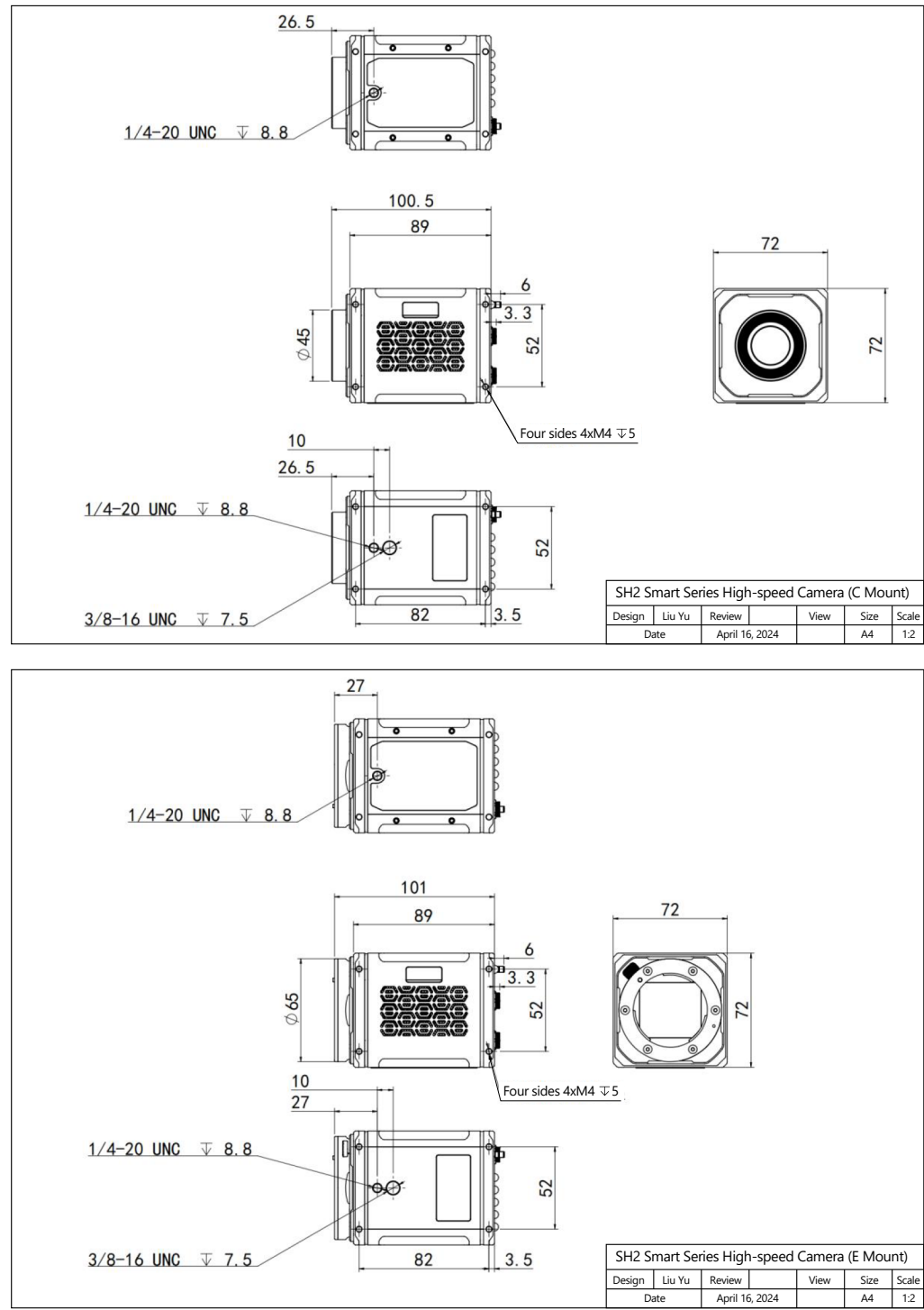
2.2.2. Dimensions of the AC Power Supply Device

66.20±2

153.50±2

1800±100mm

120±10mm

3000+50/-0mm

110±10mm

OD6.00以上
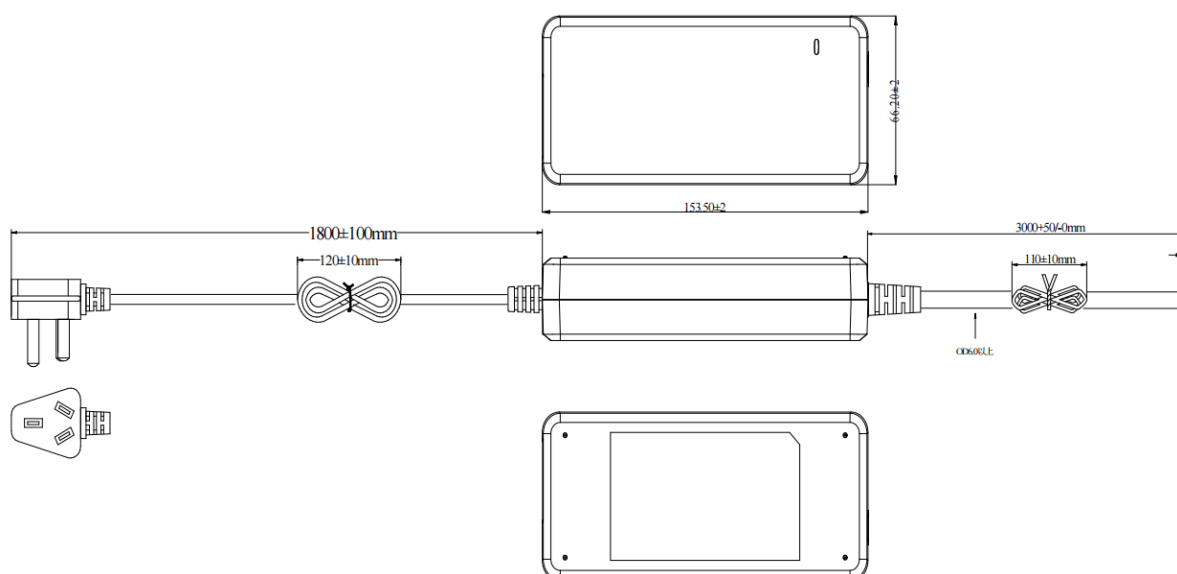
3

Chapter 3 Warranty

This chapter provides an overview of the warranty.

3.1. About Warranty

This system has been rigorously tested at the factory. However, in case of failure due to manufacturing defects, it will be repaired free of charge during the warranty period.

■   Exceptions

The following exceptions will result in paid repairs, even within the warranty period.

1. Damage or failure caused by fire, earthquake, flood, lightning, other natural disasters, pollution or abnormal voltage.
2. Damage or malfunction or maloperation caused by falling or improper handling during transportation or moving after purchase.
3. Consumables (e.g. cables)
4. When the system is repaired, adjusted or replaced by an entity other than SSZN service, and subsequent damage or failure is caused by using the product.

REFERENCE

For inquiries related to our products, please refer to "4.1 Contact Information".

4

Chapter 4 Contact SSZN

This chapter lists the contact information that should be used to contact SSZN when there is a system malfunction or when certain parts of the manual are unclear.

4.1. Contact Information

For inquiries about SH2 high-speed cameras, please contact SSZN through the following information. In addition, you are kindly required to verify and prepare the following items before the inquiry.

Items that need to be verified	Required information
Contact Information	Company, school, or organization name, contact person's name, contact phone number, contact email address.
Product name	SH2-20x
Product ID	Displayed at the nameplate seal.
The condition of the system, the description of the problem, and so on.	

Contact us	
The headquarters	SHENZHEN SINCEVISION TECHNOLOGY CO., LTD. Address: 5th Floor, Building 2, Chongwen Industrial Park, Nanshan Zhiyuan, Nanshan District, Shenzhen, China TEL: 0755-29655425, 4009660626 Website: www.cnsszn.com
Dongguan Office	Address: Room 406, Building F4, Tian'an Digital City, Nancheng District, Dongguan City, Guangdong Province, China
East China Office	Address: Room 1305,Building 7,Xiangyu Liang'an Trade Center, No.1588, Chuangye Road, Kunshan, Jiangsu Province, China
North China Office	Address: Room 808, Building 3, Jinmao Plaza, Auto Museum East Road, Fengtai District, Beijing
Southwest China Office	Address: Room 604, Block B,Yingchuang Interational Building, No. 66, Chuangzhi South 1st Road, Pidu District, Chengdu, China