

USB3.0 UV CMOS Camera

ARTCAM-2020UV-USB3

INSTRUCTION BOOKLET

4.00 M Pixels

ARTCAM-2020UV-USB3

ARTRAY CO., LTD.
ARTRAY

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1. Attention

■About this manual

1. Before using the camera, please read this manual thoroughly.
2. Please keep this manual reachable and always refer to the contents when needed.
3. Please contact us if the manual is lost or damaged. We will provide a replacement.
4. We cannot guarantee the safety of improper uses of the camera.
5. For your safety, please follow the directions of this manual.
6. All contents are subject to change.
7. Images in this manual may have been simplified to be easier comprehended.
8. Please contact us if you find any unclear points or mistakes in this manual.
9. Quoting, copying or altering some or all parts of the manual without our permission is prohibited.
10. We are not responsible for any lost or damages on your profits due to the use of our products.
11. Please understand that our oversea branches do not provide maintenance or repair services.

■About the Icons

To keep the safety of the user, other people and their properties, please pay attention to the following icons.



Warning

If the user fails to follow the instruction, serious injury or death may occur.



Caution

If the user fails to follow the instruction, physical injury on human or damages on hardware may occur.

■For Safe Use



Warning

●In following circumstances, please stop using the product and turn off the power immediately to prevent the risks of fires and electric shocks. If the product is defective, please contact us for repair or exchange. For your safety, please do not disassemble, modify or repair the camera on your own.

Please stop using the product and turn off the power immediately when:

- The product becomes smoky or gets extremely hot on the surface, or makes unusual smells or sounds.
- Foreign material or water gets into the product.
- The product falls and becomes damaged.

●Do not place the product on unstable surfaces. The product may be fallen and people may get hurt.



Caution

●Do not expose the product to steam or fumes to avoid electric shocks and fires.

●Do not leave the product in high temperature places such as inside of vehicles or under direct sunlight. High temperature may cause damages to the camera, or even cause fires.

●Do not cover the product with cloth or other materials. The product may get extremely hot and the heat may cause deformations on the parts or even cause fires.

●Please avoid dropping or shocking the product as the product may be damaged.

●Do not touch the cable with a wet hand. Such action may cause electric shocks.

●Please avoid continuously contacting the surface of the camera to your skin when the camera is being used. The surface temperature of the camera may cause burns.

■Other Notices

●Please do not use the camera under strong lights such as sun light for a long period. Also please do not expose the camera under strong lights even when the product is not being used because the sensor might be damaged.

Maintenance

● Wipe the dirt on surface with soft cloth or tissue paper. Do not use alcohol, thinner or benzene to avoid damaging the surface paints.

Electro Magnetic Interference

●The camera may interference with electronic devices such as TV and radio. Please do not place the camera next to such equipment.

■Export Control

The Government of Japan controls military sensitive goods and technologies including relevant dual-use goods and technologies.

This product is a Catch-all Control item subject to the Foreign Exchange and Foreign Trade Act and its relevant legislations. Except for exporting to the 26 white countries designated in the Cabinet Order, export licenses are required if the products are going to be used for military use or if the end user of the product is related to all kinds of military activities. If your circumstances cause the need to apply export licenses, please notify us before you place orders. Also, please notify us in advance if the end users or purposes of use change after the purchase and thus cause the need to apply export licenses.

*The 26 white countries not under the UNSC Arms Embargo:

Argentina, Australia, Austria, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxemburg, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States

About the Japanese Security Export Controls, please refer to the webpage for Security Export Control Policy, The Ministry of Economy, Trade and Industry:
<http://www.meti.go.jp/policy/anpo/englishpage.html>

■Guarantee

To save the environment, we do not issue warranty in printed format. Instead, all records of the warranty periods, delivery dates and the customer information are well kept in our system.

For more details, please refer to the sites below:

Hardware Warranty: http://www.artray.us/download/artray_warranty.pdf

■Limited Responsibility

We do not guarantee the functions of this product or the descriptions on this manual to be completely adapted to the users' end applications or marketing purposes. We are also not held responsible for any direct or indirect damages caused by our products under any circumstances.

Please do not use this product on applications that require high reliability. This product is not manufactured to be used as medical, nuclear, aerospace, transportation equipment or equipment that is highly related to human safety. We are not held responsible for any damages on the users' property, equipment or personal safety caused by this product.

■Dispose

To dispose this product, please return the camera to us. If you decide to dispose the camera without returning it us, please follow related regulations and have the camera disposed as an industrial waste. Please always keep records of the dispose, and make sure the disposed camera cannot be accessed or used by any 3rd party.

2. Introduction

ARTCAM-2020UV-USB3 is an ultraviolet camera that has high sensitivity to the wavelength band between 200 nm to 1100 nm.

Adopting USB3.0 interface, thus enables direct data transfer to PC without a capture card.

3. Main Features

- UV Detection with High Sensitivity

The adopted CMOS sensor has high sensitivity to the wavelength band between 200nm to 1100nm. Therefore, it is able to detect beyond the visible light region and visualizing things that difficult to be seen by unaided eyes or common CCD / CMOS cameras.

- USB3.0 Interface

Adopting USB3.0 interface, thus enables direct data transfer to PC without a capture board or a host adapter card.

4. The Product

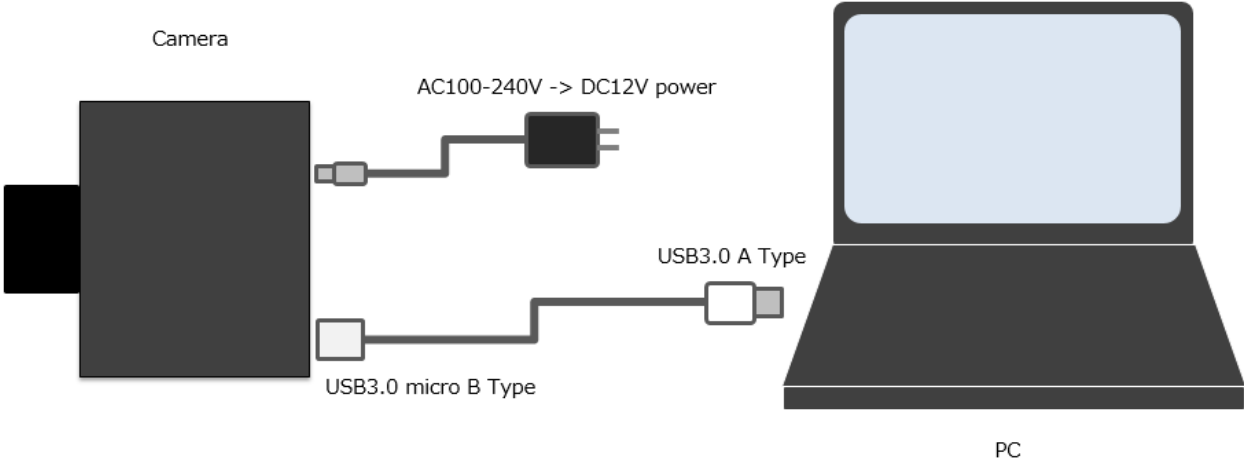
- 1) Camera
- 2) USB3.0 cable (Type A-B connector Approx. 3m)
- 3) AC adapter (AC100-240V -> DC12V)
- 4) Software CD

<Options>

C Mount Lens

5. Connections

5.1. Connecting Method (an example)



6. Specifications

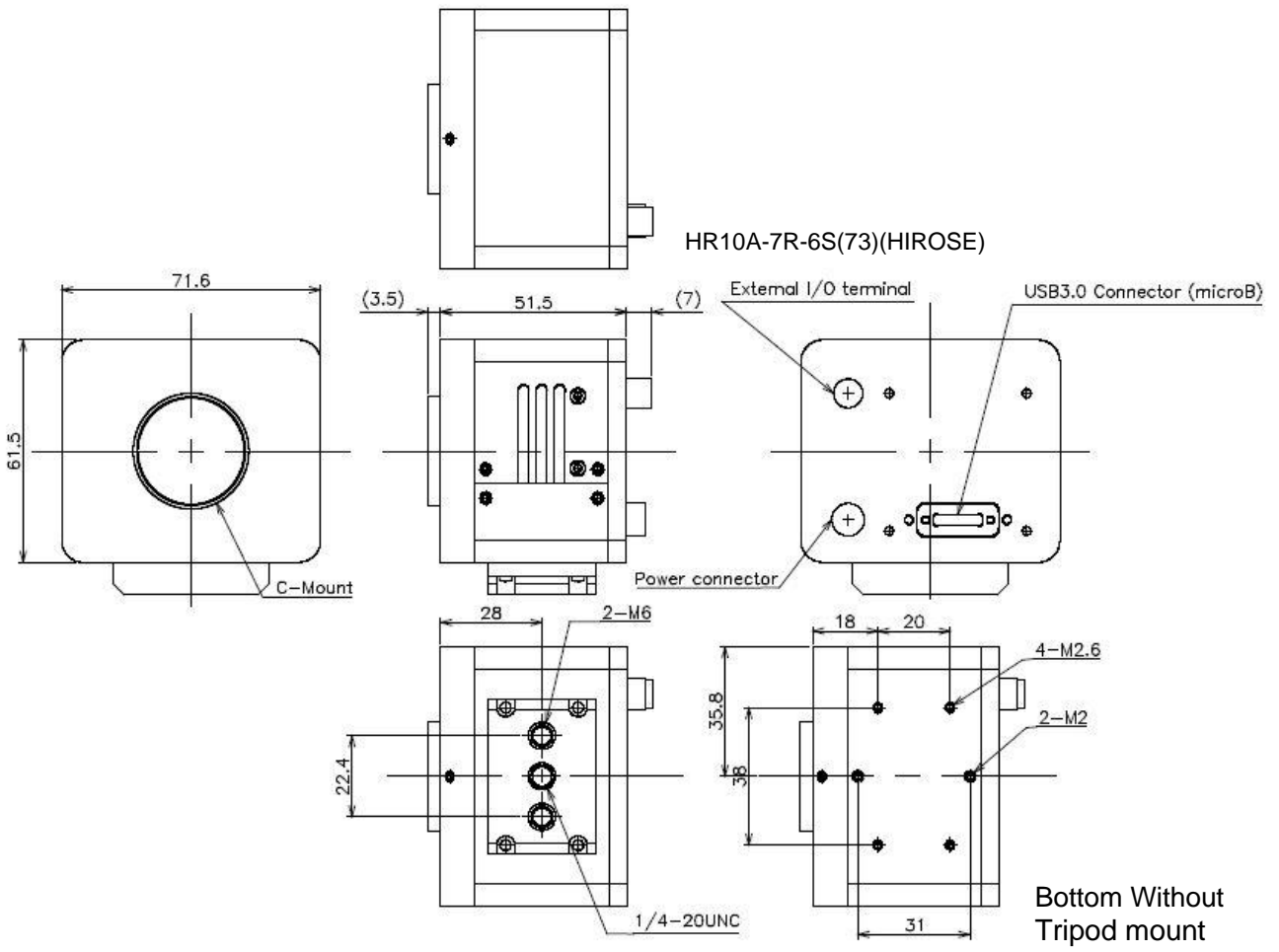
6.1. Camera Specifications

6.1.1. Camera specification list

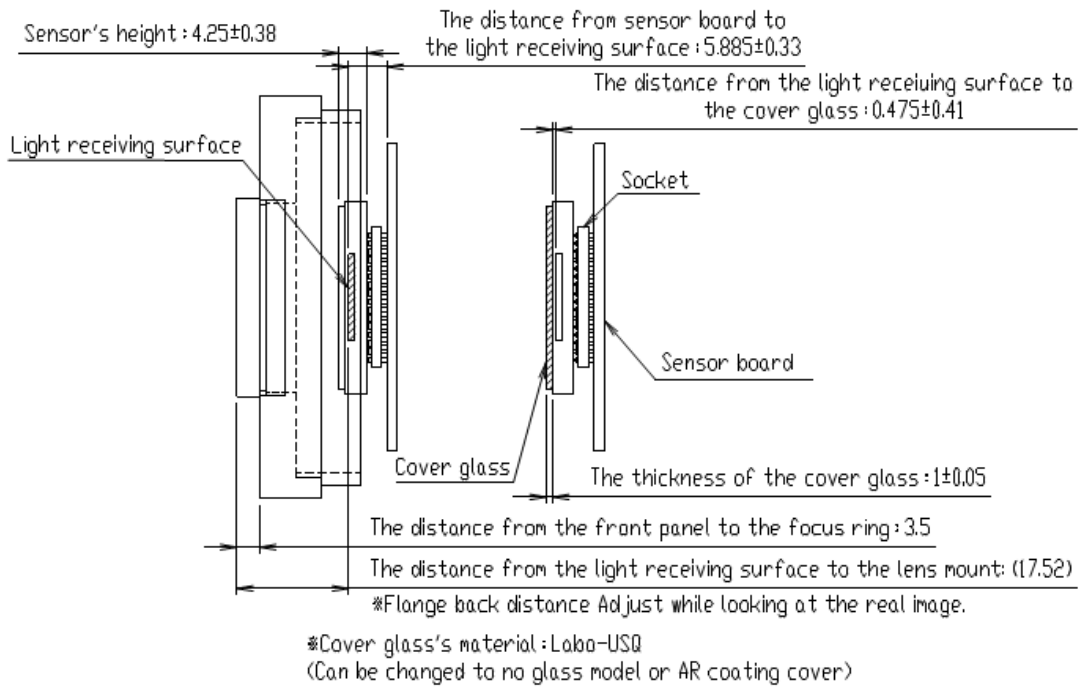
Items	
Image pickup device	Gpixel 4M Pixels CMOS Sensor GSENSE2020BSI
Number of total pixels	2056(H) × 2058(V)
Number of effective pixels	2048(H) × 2048(V)
Pixel Size	6.5(H) [μm] × 6.5(V) [μm]
Imaging area	13.3(H)×13.3(V)[mm] (Diagonal 18.809[mm], Approx.1.2 inch)
Detection frequency band	200~1100nm
Shutter Type	Rolling Shutter (Global reset possible)
Saturation capacity / readout noise	54ke- 1.6e- @12/11bits
A/D Resolution	11/12bits
Interface	USB3.0 Bulk
Number of output bits	12bits
Frame Rate	43 fps
Shutter Speed	56μsec ~ 1sec
Synchronization System	Internal Synchronization / External Trigger Synchronization
Lens Mount	C Mount
External I/O terminal	HR10A-7R-6S(73) (HIROSE)
Power	DC12V External input
Power Consumption	Approx.6W (during normal operation)
Ambient Conditions	Operating Temperature/Humidity : 0~35°C/10~80%(Non condensing) Storage Temperature/Humidity : 0~60°C /10~95%(Non condensing)
External Dimensions	71.6(W) × 61.5(H) × 51.5(D) mm ※Exclude lens, tripod mount and projections
Weight	Approx. 240g ※Exclude lens, tripod mount and projections

※All by nominal value

6.1.2. Dimensional Outline



6.1.3. Schematic Diagram of the Sensor



6.2. Camera's Functions

6.2.1. Shutter Speed

The exposure time (electronic shutter speed) of the camera can be set.

The exposure time can be calculated by the following formula:

Exposure time = the setting value of the shutter speed * 1 H period (Setting range: 8~89285)

※1 H period = 560(Minimum) * 1PCLK = 11.2μsec.

※1PCLK = 1/50,000,000sec. = 0.020μsec.

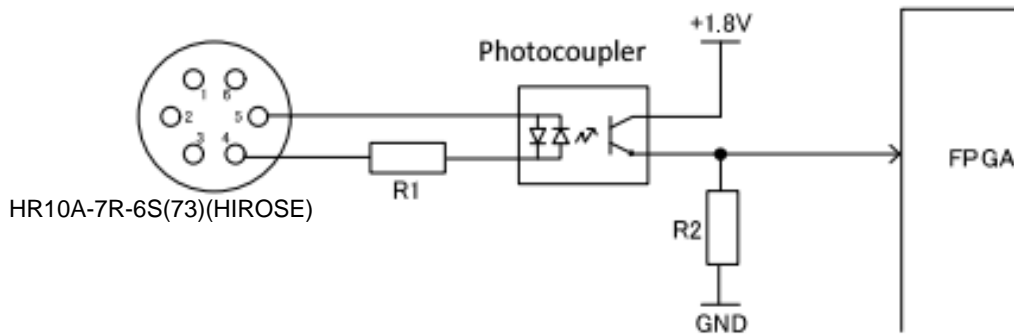
The exposure time is 0.056 ms to 1,000 ms
(The software supports from 0.1 ms to 1,000 ms*)

*The setting resolution on the software is in units of 100 μs (0.1 ms), and exposure time will be set to the closest value calculated within the software.

6.2.2. External Trigger Function

This camera has an external trigger electronic circuit, which is insulated by a photocoupler, and thus enables synchronized shooting by the input signal received from the external circuit.

Trigger input circuit diagram



R1 = 2.4kΩ (5~12V)

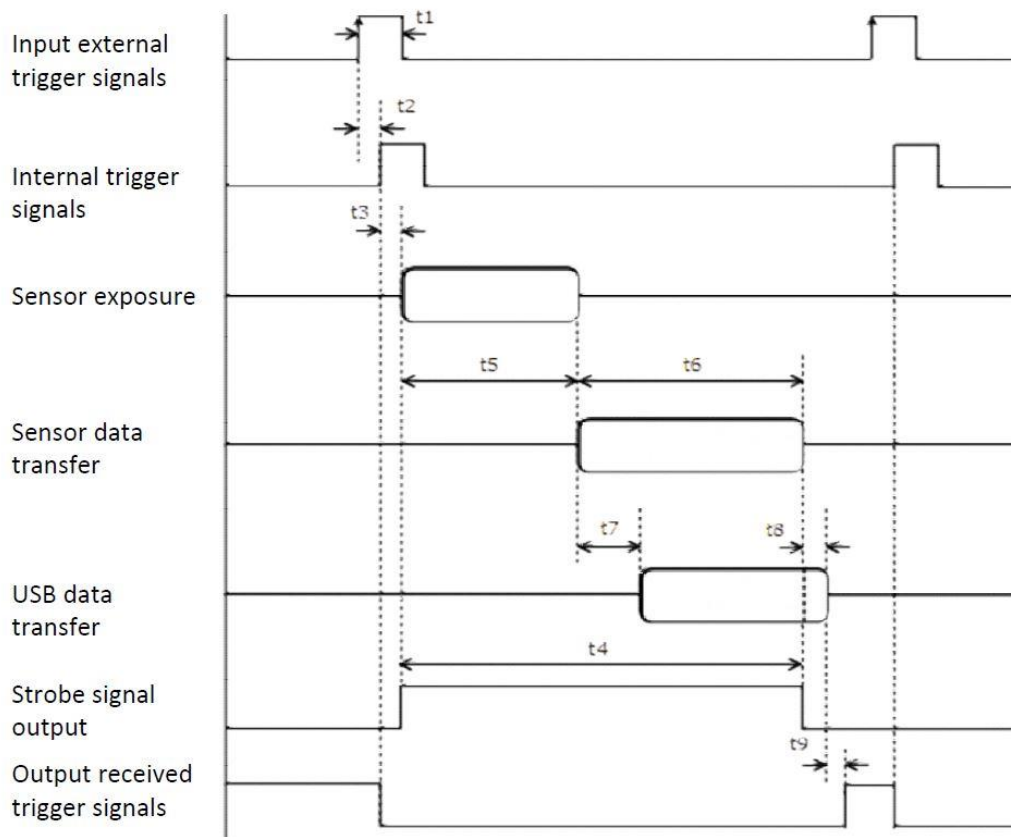
R2 = 4.7kΩ

The Pin Assignment of the External I/O Terminal

Pin Number	Function
1	GND
2	External output 1 (Vertical Synchronization) ※
3	External output 2 (Strobe) ※
4	External Input (-) (Trigger Reception -)
5	External Input (+) (Trigger Reception +)
6	+12V

※When outputting, please use open drain (6.5V, 50mA)

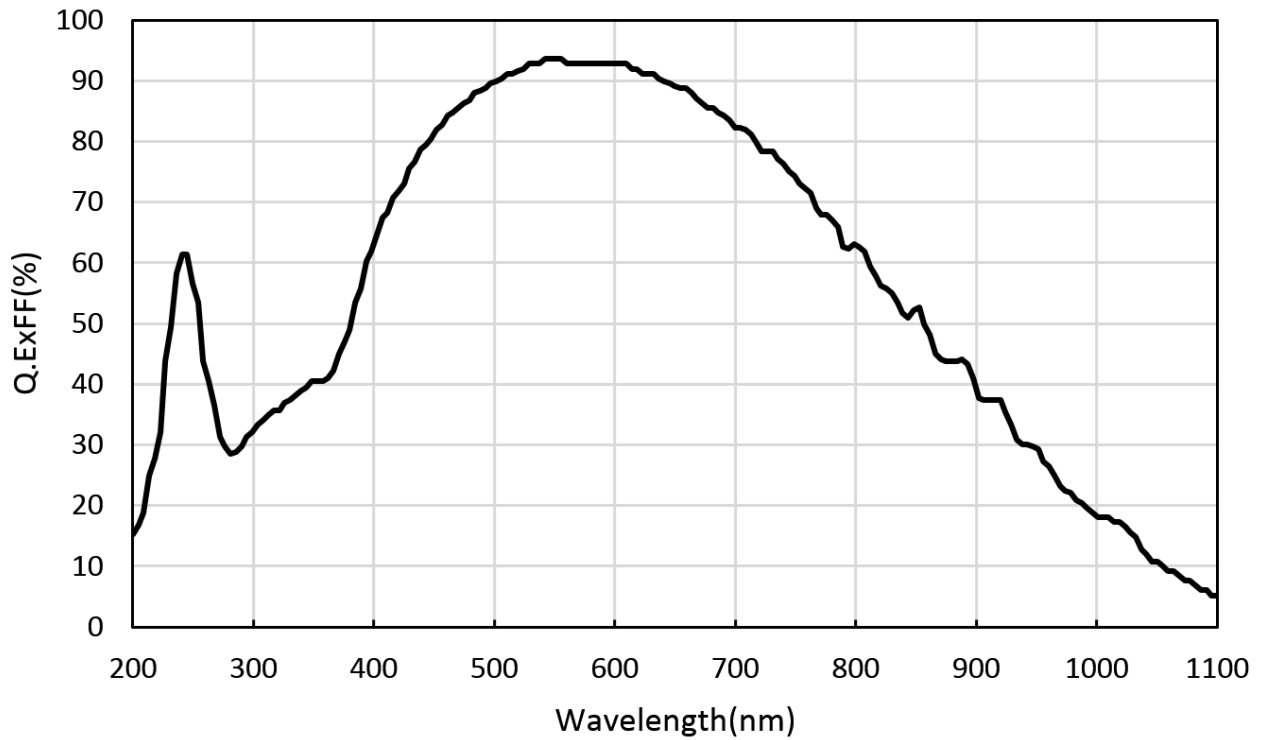
Details of trigger timing



Item Numbers	Items	Required Time
t1	Effective Trigger Input Pulse	>10μsec.
t2	Time required from the starting of the External Trigger to the starting of the Internal Trigger Signals (may delay caused by the photocoupler)	<1μsec.
t3	Time required from the starting of the Internal Trigger Input to the Exposure Time	<1μsec.
t4	Strobe Time	t5 + t6
t5	Exposure Time	Exposure Time = the setting value of the Shutter Speed * 1 H period ※1 H period = 560(Minimum) * 1PCLK = 11.2μsec. ※1PCLK = 1/50,000,000sec. = 0.020μsec.
t6	Time required for data transfer (from the sensor to the FPGA)	(Effective Vertical Pixels + 2) * 1 H period
t7	Time required for the transfer (from the FPGA to USB)	>3 H period
t8	Time required from the completion of the sensor data transfer to the completion of the USB data transfer	>3 H period
t9	Time required from the completion of the internal data transfer until the next trigger input becomes available	Approx. 1 H period

7. Spectral Sensitivity Characteristics

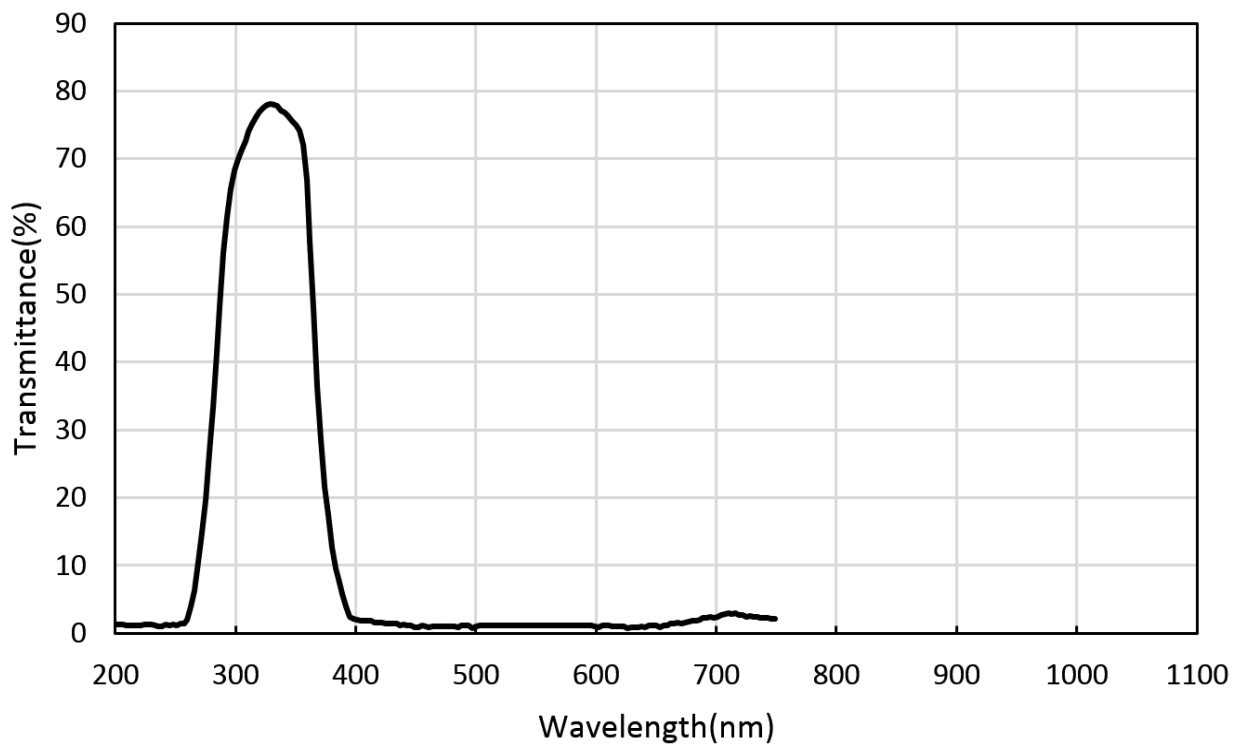
7.1. ARTCAM-2020UV-USB3



7.2. UV Bandpass Filter (U340) (Optional)

ARTCAM-2020UV-USB3 is possible to choose to install an additional filter U340, which can absorb visible wavelengths and only allow ultraviolet wavelengths to pass.

Please refer to the following Spectral sensitivity line chart for detail.



8. Systems Requirements

8.1. Recommended Specifications

- Host Controller

This camera is applicable to USB 3.0.

Connecting to USB 2.0 host controller may cause low-speed or failure to function properly.

- CPU

The driver of this camera is applicable to computer architecture “x86” or “amd64”.

The specification of CPU effects directly the imaging process speed, therefore it is highly recommended to utilize a high-end CPU if possible.

- Memory

In the viewer software, there is a data buffer which can store 4 to 8 frames.

Therefore, it is necessary to keep spare space at least for 8 frames in the memory.

(For example, when using 1.3MP color camera, $1280 \times 1024 \times 3 \times 8$ [byte] = 30[MB] is necessary.)

It is highly recommended to keep enough memory space especially when using high resolution camera.

- OS

This camera is applicable only to the architecture of Windows NT (32bit/64bit).

Standard functions are confirmed with OS after Windows 7.

In addition, it is recommended to use Windows 10.



Caution

- Please refer the restrictions below when you use ARTCAM series.

- (1) Recommended System Requirements

If the system specifications do not meet the requirements recommended above, it may be difficult to run at the maximum frame rate.

- (2) Use of other USB3.0 Hardware

The data on our camera/converter is transferred in bulk mode. For this reason, when using our camera/converter, please avoid using other bulk transferred USB3.0 hardware such as Memory stick, External HDD, External DVD, CDROM etc.

As a solution, we recommend installing a PCI USB host card to the PC and connect external USB hardware to this port only.

- (3) USB3.0 Cable Extension

We cannot guarantee the functionality of the USB3.0 camera if the user adopts USB3.0 extension cables or repeaters which are not confirmed by us. With the extension cables or repeaters, the bandwidth of transfer may differ, and thus caused malfunctions such as a low frame rate or recognition failure on the camera.

What may cause the problem is that the regulation of the power lines becomes not enough, and so causes impedance mismatch on data signals.

*For the recommended extension cable, please contact our sales department.

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