May 1, 2025
Ver1.00

# USB3.0 Output
# High resolution CAMERA
# ARTCAM-5030-USB3
# INSTRUCTION BOOKLET

ARTRAY CO., LTD.

# Contents

# 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 do not guarantee the safety of the camera when used improperly.
5. For your safety, please follow the instructions in this manual.
6. All contents are subject to change.
7. Images in this manual may have been simplified for easier comprehension.
8. Please contact us if you find any unclear points or mistakes in this manual.
9. Quoting, copying or altering any or all parts of this manual without our permission is prohibited.
10. We are not responsible for any loss or damages to 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 ensure the safety of the user, other people and their property, 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 to humans or damage to hardware may occur.

■For Safe Use

## Warning

●Under the following circumstances, please stop using the product and turn off the power immediately to prevent the risks of fire and electric shock. If the product is defective, please contact us for repair or replacement. For your safety, please do not disassemble, modify or repair the camera yourself.

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

・The camera emits smoke, becomes abnormally hot, or produces unusual smells or sounds.

・Foreign objects or water have entered the camera.

・The camera was damaged due to impact.

●Do not place the product on unstable surfaces, as it may fall and cause injury

## Caution

●Do not expose the product to steam or fumes as this may result in electric shock or fire.
●Do not place or store the product in high-temperature environments such as near open flames, inside vehicles or under direct sunlight. It may adversely affect internal components of the product and could potentially cause a fire.
●Do not cover the product with cloth or other materials. The product may overheat, which could deform its components or lead to a fire.
●Avoid dropping or subjecting the product to strong impact as this may cause damage.
●Do not touch the cable with wet hands as this may result in electric shock.
●Avoid prolonged contact with the surface of the camera while it is powered on. The surface may become hot and could cause low-temperature 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 any dirt from the camera with a soft cloth or tissue. Do not use alcohol, thinner or benzene to avoid discoloration or damage to the surface coating.

■Notice on Radio Interference
●Using the camera near a radio or television receiver may cause reception interference.

■Export Control
This product is a Catch-all Control item subject to the Foreign Exchange and Foreign Trade Act and its relevant legislations. Except for exports to the 27 white countries designated by Cabinet Order, export licenses are required if the products are intended 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.

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

The above is based on the applicable laws and regulations in effect at the time of issuance of this document. Please ensure to check the latest laws and regulations before exporting this product.

■Guarantee
To support environmental sustainability, we do not issue printed warranty documents. Instead, all records of the warranty periods, delivery dates and the customer information are securely stored in our system.

For more details, please refer to the following link:
Hardware Warranty: http://www.artray.us/download/artray_warranty.pdf

●We do not guarantee that the functions of this product or the descriptions on this manual are suitable for the customer's intended use or marketability. Furthermore, we assume no liability for any direct or indirect damages arising from the use of this product.

●Please do not use this product in applications requiring high reliability. This product is not designed or intended for use in medical devices, nuclear facilities, aerospace equipment, transportation systems, or any other equipment critical to human safety. We are not held responsibility for any damages on the users' property, equipment or personal safety caused by this product.

■Disposal
●To dispose this product, please return the camera to us. If you decide to dispose the camera without returning it to us, please follow relevant regulations and ensure that it is treated as industrial waste.
Always keep records of the disposal and ensure that the disposed camera cannot be accessed or used by any third party.

# 2. Introduction

This manual elaborates the product specifications of the camera equipped with CMOS sensor and USB3.0 output, the color camera ARTCAM-5030-USB3, the RGB-IR camera ARTCAM-5030-IR-USB3, the monochrome camera ARTCAM-5030-BW-USB3, and the naked camera ARTCAM-5030-NA-USB3.

# 3. Features

- RGB-IR Camera

An RGB-IR camera can capture both the visible and infrared spectral ranges without the use of a mechanical switch.

- Naked Camera

A naked camera refers to a sensor that does not incorporate microlenses or color filters, making it suitable for applications such as electron microscopes and X-ray detection cameras.

- Global Shutter Support

The CMOS sensor adopts a global shutter type, enabling the capture of sharp images without image smearing, even when photographing fast-moving subjects.

- USB3.0 Interface

It features a USB 3.0 interface, ensuring excellent compatibility with PCs and allowing direct image transfer without the need for a capture card or a host capture card.

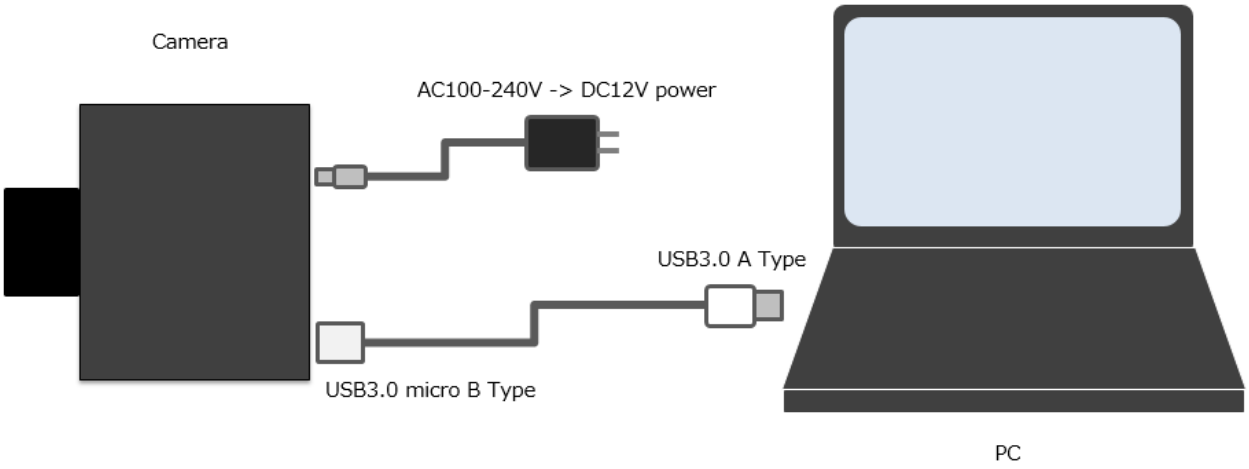
# 4. The Product

1) Camera
2) USB3.0 Cable (USB3.0 Type A to micro B, 3m approx.)
3) AC adapter (AC100-240V -> DC12V)
4) Viewer software and Device driver CD

<Option>
1) F mount Type
2) Sensor exposed Type without lens mount (camera case included)
3) Board Type (no camera case)
4) Extension cable
5) Various lenses
6) Various filters

# 5. Connections

## 5.1. How to Connect a Camera (an example)



# 6. Specification

## 6.1. Specifications

| Items | ARTCAM-5030-USB3 | ARTCAM-5030-IR-USB3 | ARTCAM-5030-BW-USB3 | ARTCAM-5030-NA-USB3 |
|---|---|---|---|---|
| Model | CANON<br>RGB Sensor<br>LI5030SAC | CANON<br>RGB-IR Sensor<br>LI5030SAI | CANON<br>Mono Sensor<br>LI5030SAM | CANON<br>Naked Sensor<br>LI5030SAN |
| Active Pixels | 5688(W) × 3336(H) | | | |
| Effective Pixel | 5688(W) × 3336(H) | | | |
| Pixel Size | 6.4[µm] × 6.4[µm] | | | |
| Active Image Size | 36.40[mm] × 21.35[mm] (35mm full size) | | | |
| Spectral Range | 350～850nm　(QE>10%) | | | |
| Shutter | Global Shutter | | | |
| S/N Ratio (reference) | TBD | | | |
| Interface | USB3.0 Bulk Transfer | | | |
| A/D resolution | 12bit | | | |
| Frame Rate | Max 18.0fps (8-bit mode)<br>Max 9.0fps (16-bit mode) | | | |
| Exposure time | 19.35 µsec. ～ 1 sec. | | | |
| Gain | x0.5, x1.0, x2.0, x4.0 (Default value：x1.0) | | | |
| ROI | ON/OFF ※Default value: OFF<br>ROI: Supported (horizontal size must be a multiple of 12,<br>and vertical size must be a multiple of 2) | | | |
| Mirroring | ON/OFF ※Default value：OFF<br>Software processing only | | | |
| Synchronization Method | Internal Synchronization | | | |
| Lens mount | Standard: M58 mount<br>Optional: F mount / Without Lens mount | | | |
| Power-supply voltage | DC12V External Input | | | |
| Power Consumption | Approx. 7.5W or less | | | |
| Ambient Conditions | Operating Temperature / Humidity: 10 ~ 25°C / 10 ~ 80%<br>（Non-water vapor condensation state）<br>(※When the ambient temperature exceeds 20°C, countermeasures against heat such as air cooling are recommended.)<br>Storage Temperature / Humidity: 0 ~ 60°C / 10 ~ 95%<br>（Non-water vapor condensation state） | | | |
| External Dimensions | 90.0(W) × 80.0(H) × 43.0(D) mm<br>※Sensor and Connector not included | | | |
| Weight | Approx. 360g<br>※Lens, tripod plate, and F-mount adapter not included | | | |

## 6.2. Functions of camera

### 6.2.1. Shutter Speed

The exposure time of the camera (electronic shutter speed) can be set in 100 µsec increments (1 line temporal resolution).

The exposure time can be calculated by the following formula:

Exposure time = the setting value of the shutter speed * 100µsec (Setting range: 1~10000)

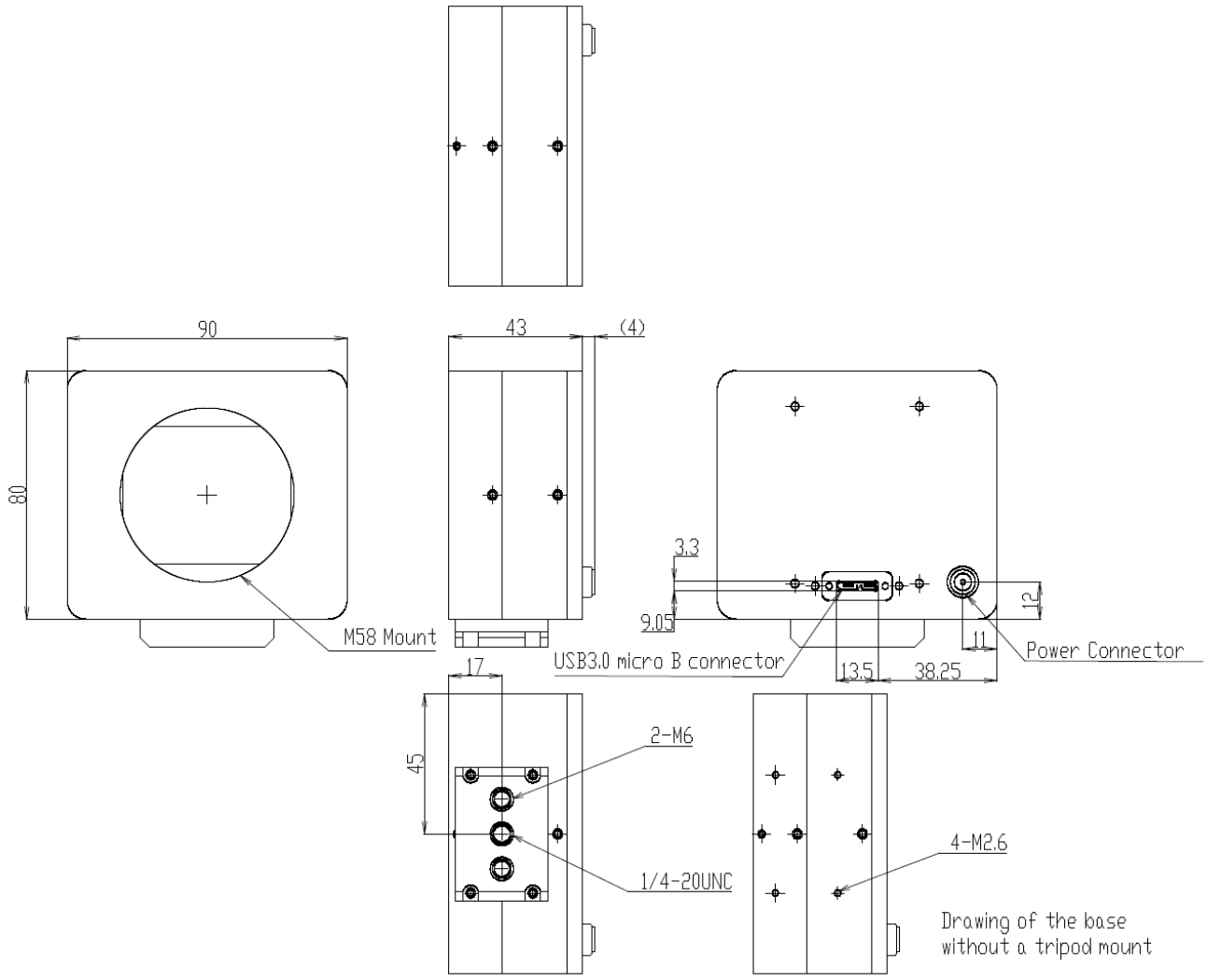
The formula for calculating 1 line time is the same for both full pixel output (5688 x 3336) and when using ROI setting, as shown below.

2 line time = 603 x 1/60000000[sec] = 10.05[µsec]

※Since the data of 2 lines are sent in 1H transfer, the setting unit becomes 2 line times.

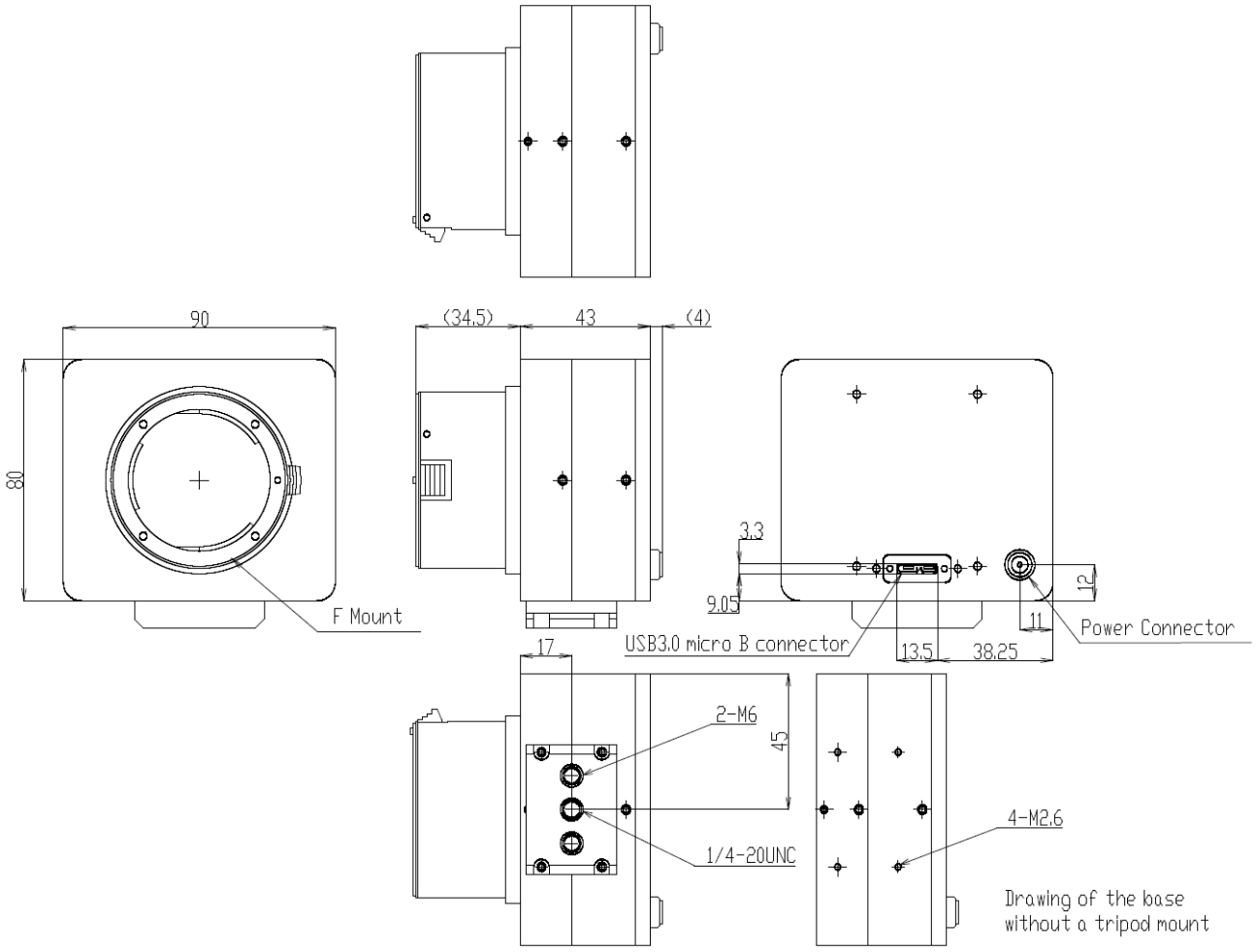
6.2.2. Dimensional Outline

・M58 mount Type



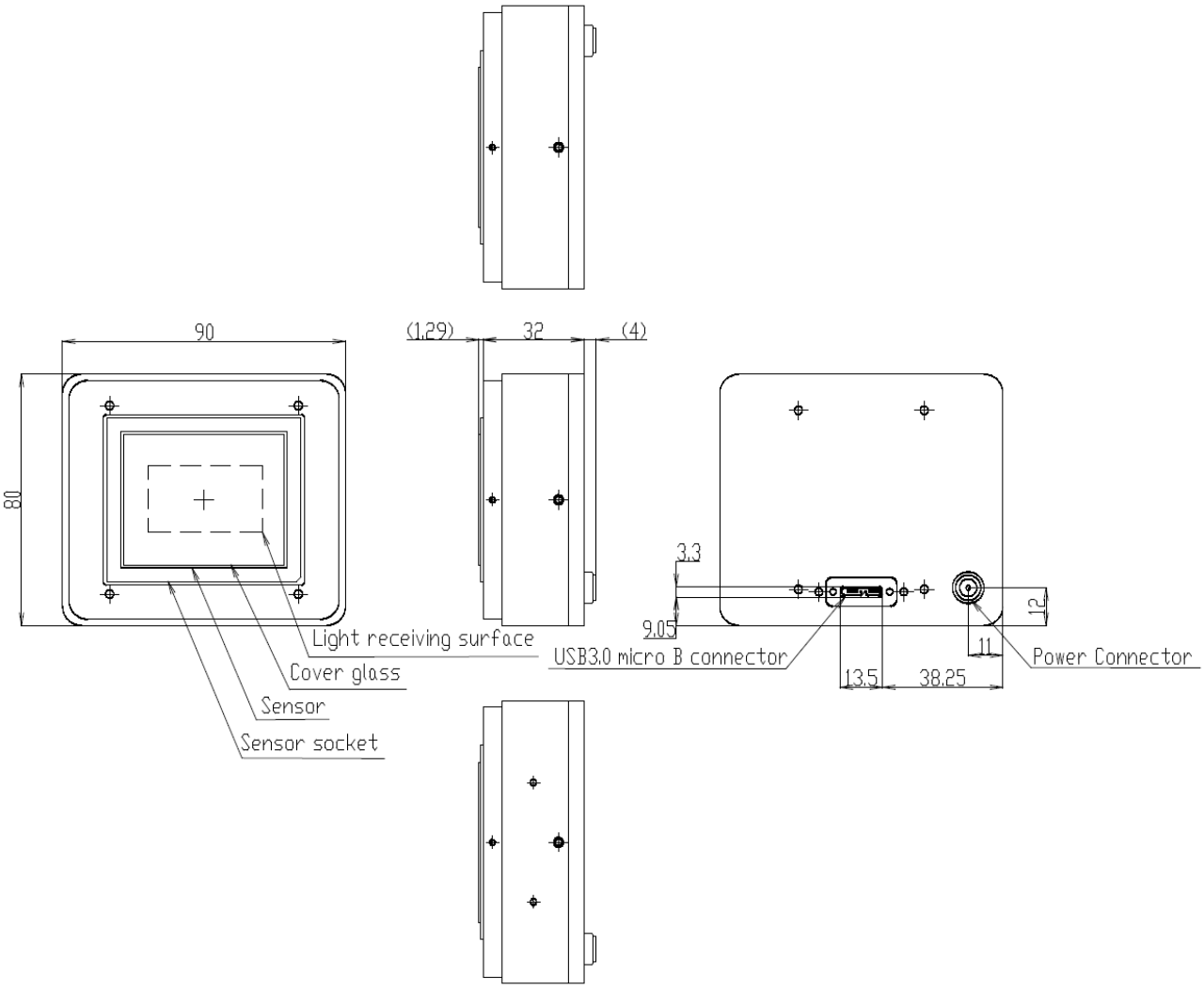

※The dimension might be changed.

・F-mount Type (optional)



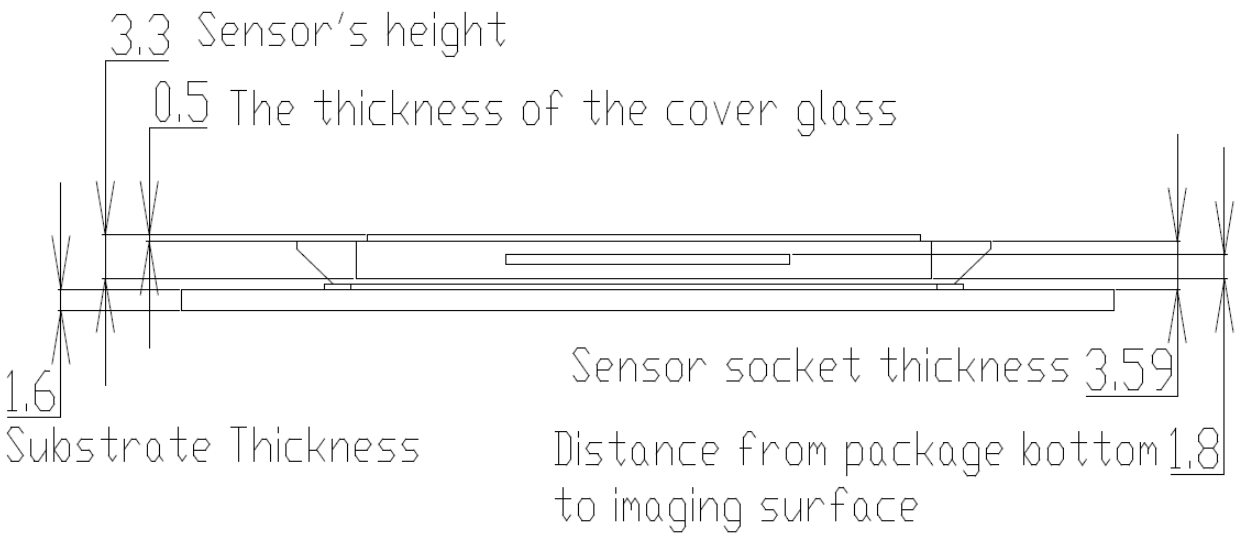

※The dimension might be changed.

・Sensor exposed type without lens mount (with camera case)

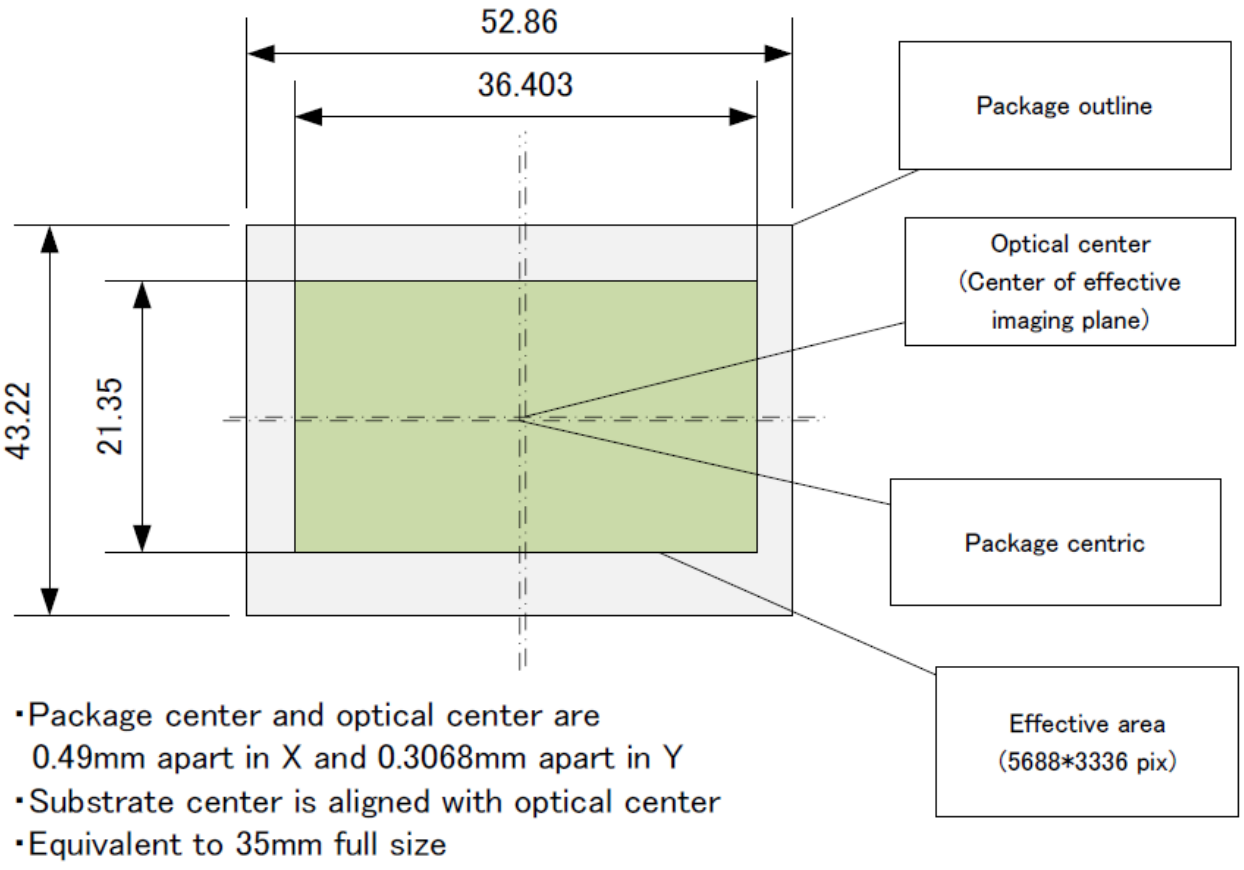



※The dimension might be changed.

6.2.3. Sensor Package Information



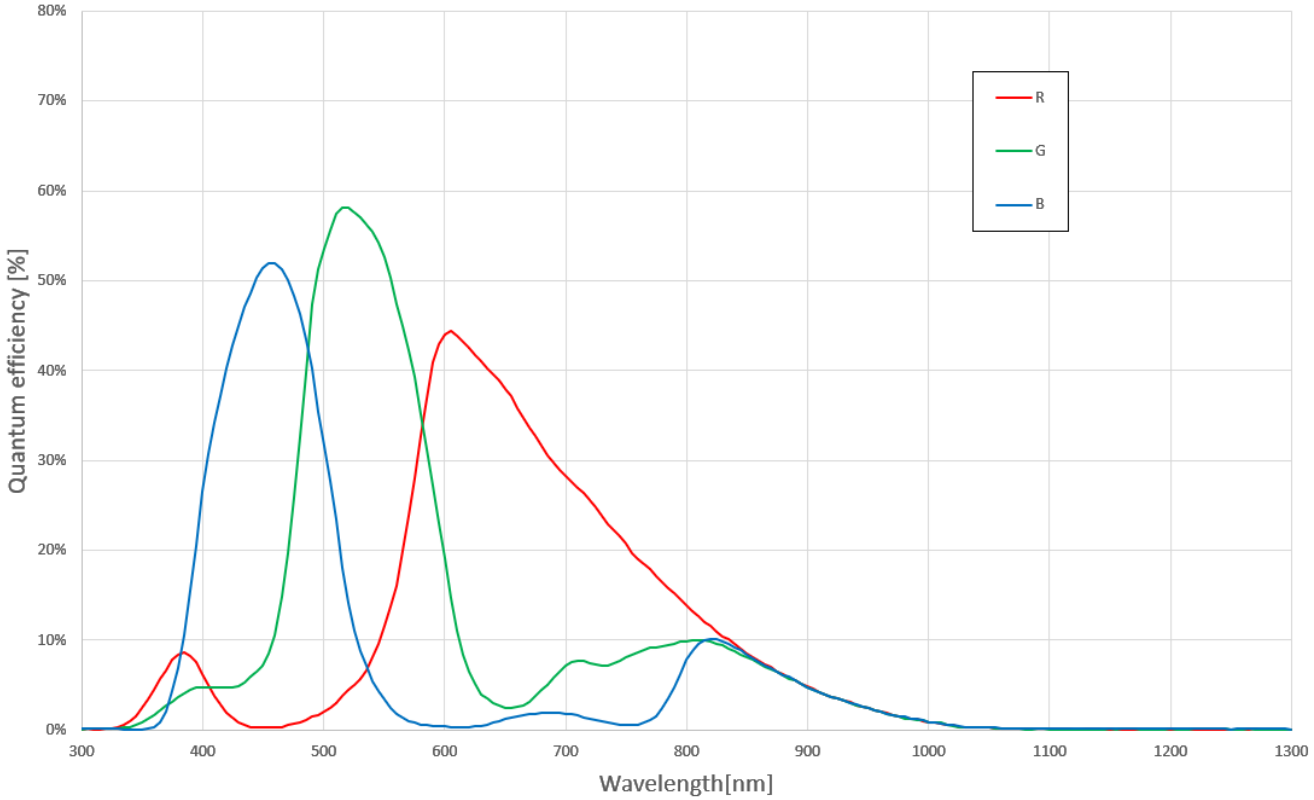

6.2.4. Position Relationship Diagram between the sensor package and the light receiving surface




H=6.4[µm] * 5688 = 36403.2[µm]
V=6.4[µm] * 3336 = 21350.4[µm]

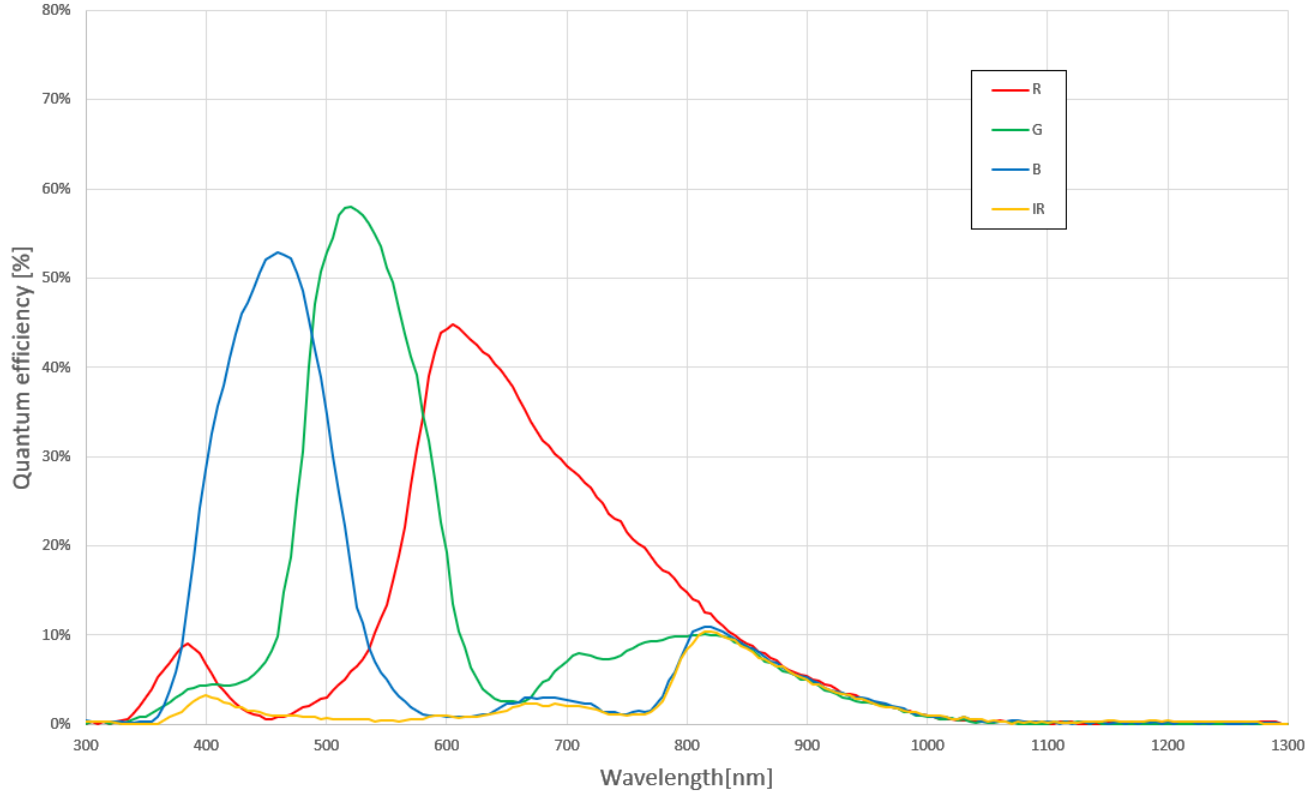
## 6.3. Spectral sensitivity characteristics (reference value)

### 6.3.1. ARTCAM-5030-USB3

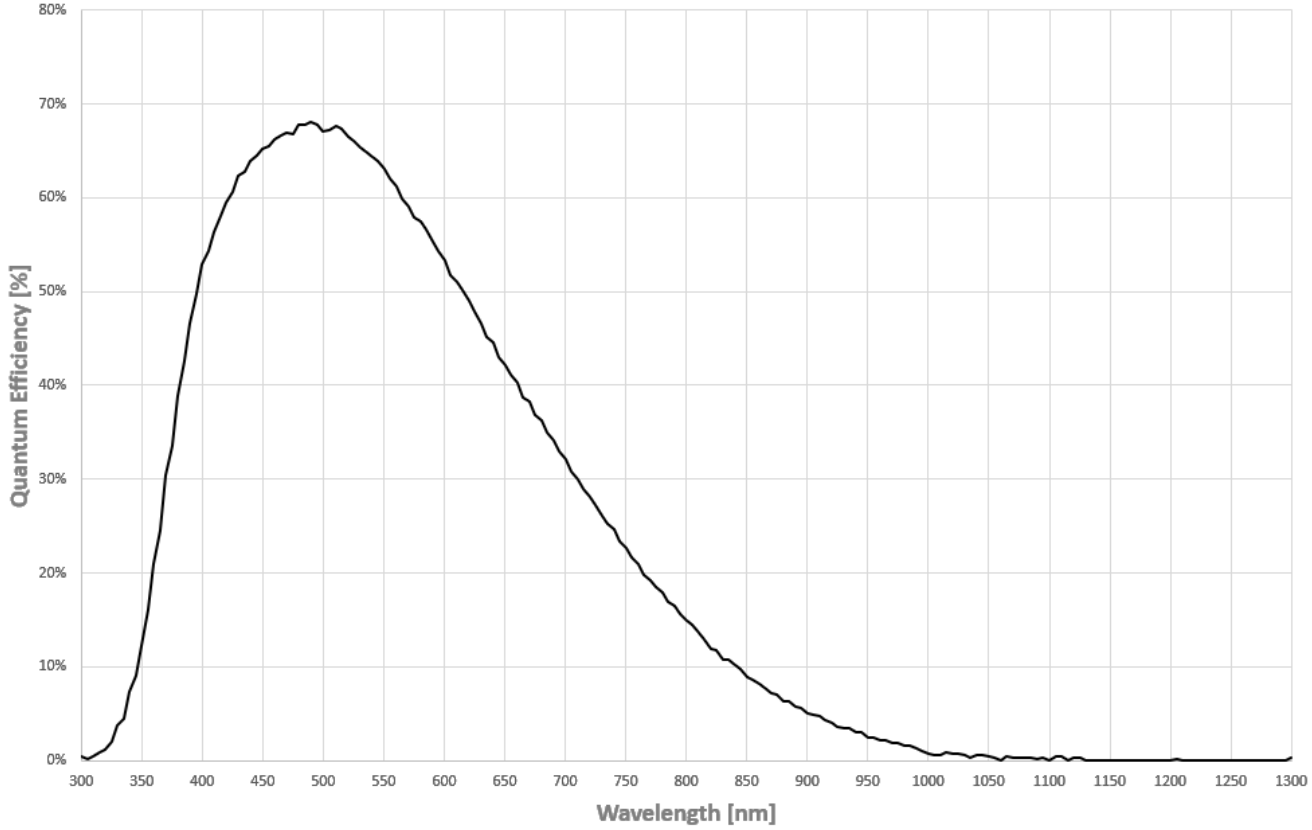



### 6.3.2. ARTCAM-5030-IR-USB3

※The sensor is equipped with the capability of capturing simultaneous images in both visible and near-infrared spectral ranges.



### 6.3.3. ARTCAM-5030-BW-USB3

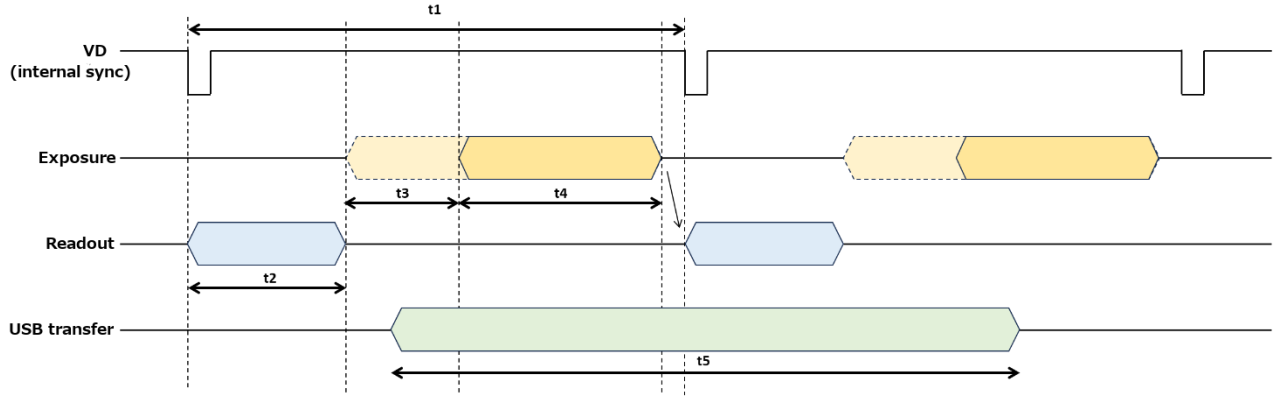



### 6.3.4. ARTCAM-5030-NA-USB3

※The sensor is equipped without microlens and color filter.

## 6.4. Timing chart

・In the case of Full screen mode (5688x3336)　Exposure time: 17.2msec or less



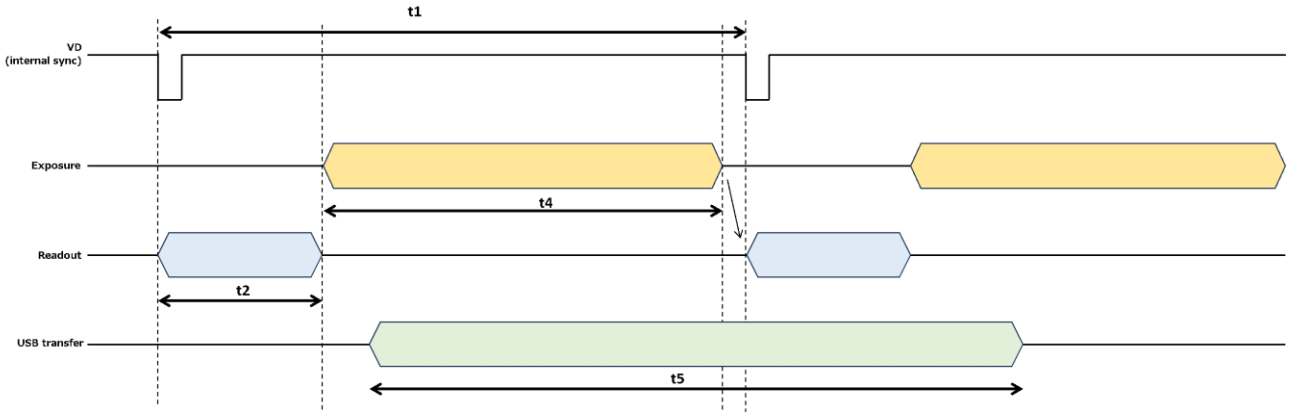

| | item | time |
|---|---|---|
| t1 | 1 frame time | 1/29.0[sec] = 34.4916[msec] |
| t2 | Charge readout period | (3336+96)/2 * 1H time = 17.2458[msec] |
| t3 | Charge dumping period | (3336+96-2)/2 * 1H time – Exposure time (t4) |
| t4 | Exposure time | Sensor Exposure setpoint * 1H time + 9.8[μsec]<br>※Closest sensor Exposure setting to the value set by the software (rounded to the nearest integer) |
| t5 | USB transfer time | Approx. 47.12msec<br>(Theoretical value in 8bit mode at a USB3 transfer rate of 3 Gbps)<br>The start of t5 depends on the timing of receiving capture commands from the software. |

1H time = 603clk * 1/60000000[sec] = 10.05 [μsec] (common to all settings)

※When using ROI settings, please replace the "3336" value in the above timing chart with the number of effective vertical pixels specified to perform the calculation. The number of effective horizontal pixels does not affect the timing.

※Although the camera does not officially support external trigger synchronization mode, the external synchronization mode is available by switching the "VD" signal in the timing chart above to be input externally. (Not recommended)

・In the case of Full screen mode (5688x3336)　17.2[msec] < exposure time < 164.6[msec]



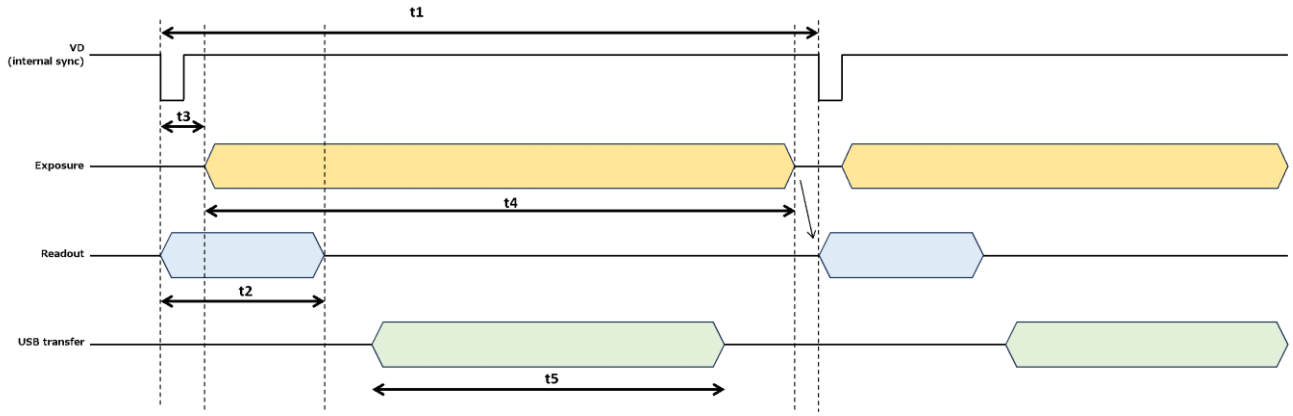

| | item | time |
|---|---|---|
| t1 | 1 frame time | ((3336+96)/2 + 2) * 1H time + Exposure time (t4) |
| t2 | Charge readout period | (3336+96)/2 * 1H time = 17.2458[msec] |
| t4 | Exposure time | Sensor Exposure setting value (<14667) * 1H time + 9.8[μsec] |
| t5 | USB transfer time | Approx. 47.12msec<br>(Theoretical value in 8bit mode at a USB3 transfer rate of 3 Gbps) |

1H time = 603clk * 1/60000000[sec] = 10.05 [μsec] (common to all settings)

※When using ROI settings, please replace the "3336" value in the above timing chart with the number of effective vertical pixels specified to perform the calculation. The number of effective horizontal pixels does not affect the timing.

※Although the camera does not officially support external trigger synchronization mode, the external synchronization mode is available by switching the "VD" signal in the timing chart above to be input externally. (Not recommended)

・In the case of Full screen mode (5688x3336) Exposure time 164.6[msec] or longer (t1≥16383H time)




| | item | time |
|---|---|---|
| t1 | 1 frame time | 10 * 1H time + Exposure time (t4) |
| t2 | Charge readout period | (3336+96)/2 * 1H time = 17.2458[msec] |
| t3 | Charge Transfer + Dumping | 8 * 1H time |
| t4 | Exposure time | VD cycle - approx. 10H time (1H time unit + 9.8[μsec]) |
| t5 | USB transfer time | Approx. 47.12msec<br>(Theoretical value in 8bit mode at a USB3 transfer rate of 3 Gbps) |

1H time = 603clk * 1/60000000[sec] = 10.05 [μsec] (common to all settings)

※When using ROI settings, please replace the "3336" value in the above timing chart with the number of effective vertical pixels specified to perform the calculation. The number of effective horizontal pixels does not affect the timing.

※Although the camera does not officially support external trigger synchronization mode, the external synchronization mode is available by switching the "VD" signal in the timing chart above to be input externally. (Not recommended)

## 6.5. System Requirements

## 6.6. Recommended System Requirements

●Host Controller

This camera is applicable to USB3.0.

Connecting to USB2.0 host controller may cause low-speed or failure to function properly.

●CPU

The driver for this camera is compatible with computer architecture "x86" or "amd64."

The speed of the imaging process is directly affected by the CPU specification.

Therefore, it is highly recommended to use 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 reserve at least 8 frames of memory for storing the image.

(For example, when using 1.3MP color camera, 1280 x 1024 x 3 x 8 [byte] = 30[MB] is required.)

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

●OS

Please note that this camera is applicable only to the architecture of Windows NT (32bit/64bit).

Standard functions are confirmed with OS after Windows 10.

In addition, it is recommended to use Windows 11.

# 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. Therefore, when using our camera/converter, please refrain from using other bulk-transferred USB3.0 hardware, such as memory sticks, external hard drives, external DVD players, or CD-ROMs etc.

We recommend installing a PCI USB host card to the PC and connecting 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. The use of extension cables or repeaters can result in variations in bandwidth, potentially leading to malfunctions such as a low frame rate or failure in recognition by the camera.

One potential cause of the issue could be insufficient regulation of the power lines, which can result in a mismatch in data signal strength.

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

(TEL: +81-3389-5488)

ARTRAY CO., LTD. Obtained ISO 9001: 2015 2018/9/17
1-17-5 Kouenjikita, Suginami-ku, Tokyo 166-0002 Japan
Tel: +81-3-3389-5488 Fax: +81-3-3389-5486
Email: sales@artray.us URL: www.artray. us