SENTECH

STC-MBA5MUSB3

STC-MCA5MUSB3
USB 3.0 Camera

Safety Precautions

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION:

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
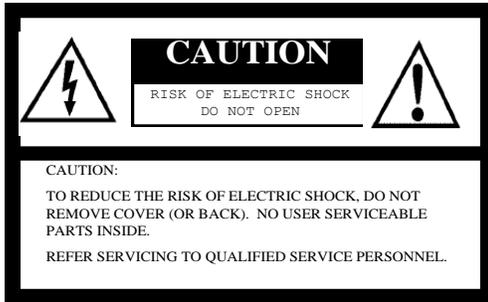
The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

For U.S.A.

Warning:

This equipment generates and uses radio frequency energy and if not installed and used properly, I.e., in strict accordance with the instruction manual, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

For Canada

Warning:

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

WARNING:

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

Product Precautions

- Handle the camera with care. Do not abuse the camera. Avoid striking or shaking it. Improper handling or storage could damage the camera.
- Do not pull or damage the camera cable.
- During camera use, do not wrap he unit in any material. This will cause the internal temperature of the unit to increase.
- Do not expose the camera to moisture, or do not try to operate it in wet areas.
- Do not operate the camera beyond its temperature, humidity and power source ratings.
- While the camera is not being used, keep the lens or lens cap on the camera to prevent dust or contamination from getting in the CCD or filter area and scratching or damaging this area.
- Do not keep the camera under the following conditions:
  - In wet, moist, and high humidity areas
  - Under hot direct sunlight
  - In high temperature areas
  - Near an object that releases a strong magnetic or electric field
  - Areas with strong vibrations
- Use a soft cloth to clean the camera. Use pressured air spray to clean the surface of the glass. DO not scratch the surface of the glass.

Copyright & Disclaimer

Sensor Technologies America, Inc. (DBA Sentech America) believes the contents and specifications of its website, catalog, documentation and ads are correct; however, Sentech America provides no representation or warranty regarding such information or product(s) contained therein. It is requested that Sentech America be given appropriate acknowledgement in any subsequent use of such work by a third party.

While every effort has been made to ensure that the details contained in Sentech America's website and all documentation are correct and up-to-date, Sentech America assumes no liability, legal or otherwise for any errors in listings, specifications, part numbers, process, software or model applications. Sentech America reserves the right to change specifications, product descriptions, product quality, pricing and application at any time without prior written or oral notice. Any party using such information assumes all risk for any and all damaged caused to themselves, a third party and/or property by virtue of incorrect information and/or failure of these products. By installing and/or using a Sentech America software development kit or other similar product and/or information obtained from Sentech America's website, catalog, documentation or ads, you hereby accept and understand these stated terms and conditions.

Table of Contents

I. Notes on PCs with Power Save Mode

When the USB camera is used with a PC that has the power save mode, such as a PC with the Intel Core i3, i5, or i7 CPU, the following problem may occur.

- An image cannot be obtained with the USB camera
- A frame drops frequently

* The issue may occur with other USB camera manufacturers as well.

A. Cause of the Issue

The PC becomes unable to transfer the image because the CPC frequently enters the power save mode during the image transfer.

B. Solutions for the Issue

This problem can be avoided by disabling the power save mode. However, depending on the PC, the power save mode cannot be disabled and the desired effect may not be achieved. In addition, when the power save mode is disabled, undesired effects such as an increase of the power consumption and the heat of the PC may occur.

1. Disable the power save mode by changing the BIOS settings.
   Either set "ACPI C State" to "Disable" or decrease the "Max ACPI C State" value step by step until you see the effect (i.e. C3->C2->C1). (The setting method and the naming may differ, and/or these settings cannot be changed depending on the PC.)

   ➢ Please contact the manufacturer of the PC about the BIOS setting.
   ➢ "ACPI C State" and "Max ACPI C State" may have different names depending on the PC.
   ➢ Users will be responsible for any change made to the BIOS setting.
   ➢ The power consumption and the heat of the PC will increase whenever the power save mode is disabled. Please understand and accept this before disabling the power save mode.

2. Disable the power save mode with the Sentech PC power management software (StPowerCtrl)
   Please refer to the Start-Up Guide for the details.

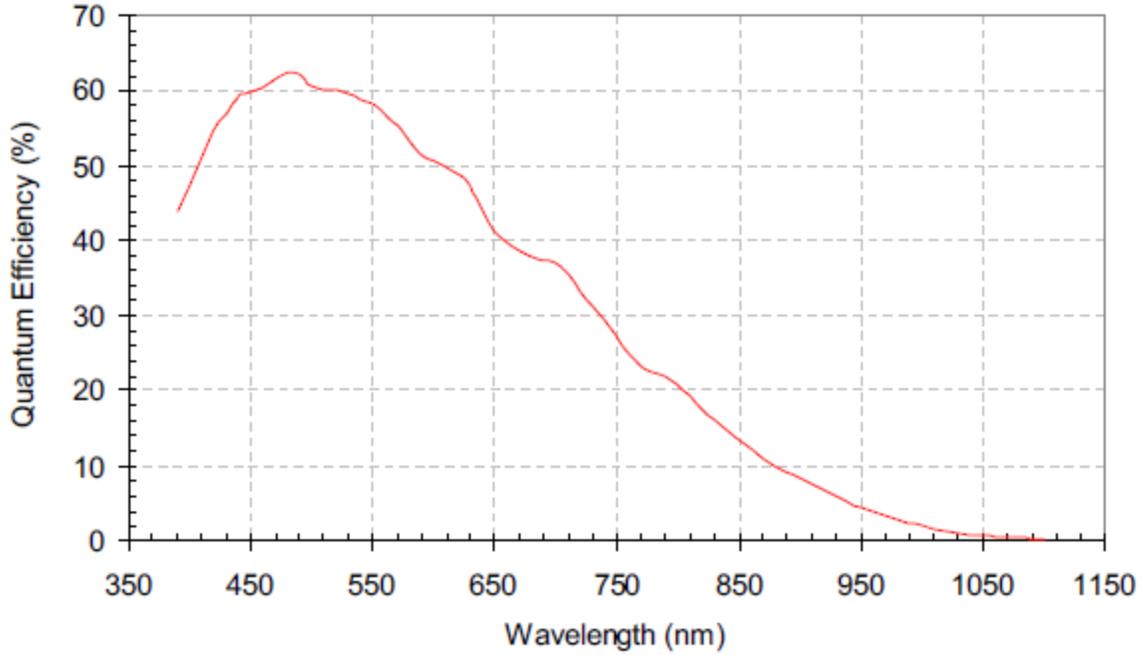3. Change the camera blanking period and reduce frame rate.

II. General Specifications

A. Electronic Specifications

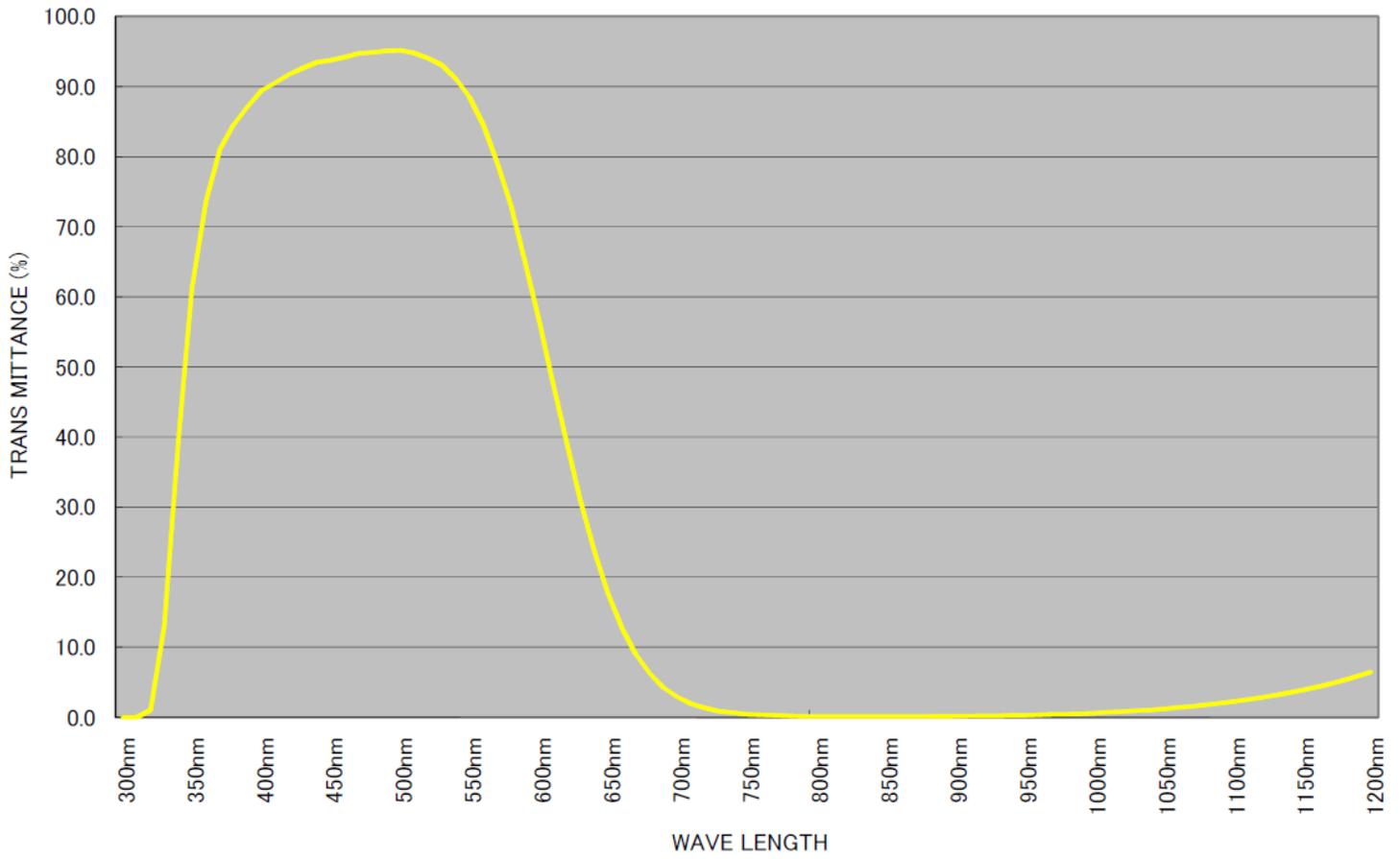| Model Number		STC-MBA5MUSB3	STC-MCA5MUSB3
Image Sensor		1/2.5″ 5M pixel Monochrome CMOS (Aptina:MT9P031I12STM)	1/2.5″ 5M pixel Color CMOS (Aptina:MT9P031I12STC)
Active Picture Elements		2592(H) x 1944(V)	
Cell Size		2.2 (H) x 2.2 (V) μm	
Scanning System		Progressive	
Shutter Type		Rolling Shutter	
Scanning Mode		Full Scanning, Variable AOI (Horizontal / Vertical)	
Maximum Frame Rate (in Full Scanning Mode)		QSXGA: 2592 x 1944 : 14fps (Settable from 6.88 to 14fps) *Frame rate will drop if connected with the USB2.0 port. （Raw 8bit output: 7fps、 Raw 10/12bit output 3.5fps）	
Maximum Frame Rate (in Full Binning Scanning and AOI Mode)		Vertical 1/2 Binning: 28fps, Vertical 1/4 Binning: 34.6fps (in full scanning mode) QXGA (2048 x 1536) : 21fps, UXGA (1600 x 1200) : 31fps, SXGA (1280 x 1024) : 42fps, XGA (1024 x 768) : 63fps, SVGA (800 x 600) : 91fps, VGA (640 x 480) : 126fps, Minimum AOI (32 x 32): 2106fps	
Sync. System		Internal	
Video Output Format		RAW8bit/10bit/12bit	BGR8bit, RAW8bit/10bit/12bit, Mono8bit/10bit/12bit
S/N Ratio (8bit)		≤ 4 Digit (Gain 0 dB)	≤ 4 Digit (Gain 0 dB)
Minimum Scene Illumination		0.3 Lux at F1.2	9 Lux at F1.2
ALC		Auto Shutter / Auto Gain	
Electronic Shutter		Free-run Mode: Exposure Time -- 32 μsec to 38sec (in full scanning mode) Edge Preset Trigger Mode: Exposure Time -- 32 μsec to 38sec (in full scanning mode) Pulse-width Trigger Mode: Exposure Time -- 32 μsec to unlimited (in full scanning mode)	
Gain	Analog	0 to 26.97 dB	
	Digital	0 to 12.04 dB	
Digital Clamp		0 to 255 (LSB of 12bit output)	
Gamma		0.1 to 4.0 (settable with 0.1 step)	
AOI		AOI (Horizontal: 32 to 2592 pixels / Vertical: 32 to 1944 lines) Adjustable Steps: 4 pixels in horizontal direction and 4 lines in vertical direction	
Binning Function		Horizontal 1/2, 1/4 Vertical 1/2, 1/4 *Only pixels in the horizontal direction can be added to increase the brightness.	
Skipping Function		Horizontal 1/2, 1/3, 1/4, 1/5, 1/6, 1/7 Vertical 1/2, 1/3, 1/4, 1/5, 1/6, 1/7, 1/8	
Mirror Image		Horizontal / Vertical / Horizontal and Vertical	
Pixel Defect Correction		Up to 64 pixels (This function is turned off at shipping.)	
White Balance		N/A	Auto / Manual/ One-shot
Operational Mode		Free-run / Edge-preset Trigger/ Pulse-width Trigger / Start and Stop Trigger	
Frame Memory		One Frame	
Interface		USB3.0 Super speed (USB3.0 Micro B)	
Input/Output		Two Inputs and Two Outputs	
Power	Input Voltage	+5V(typ.) (Conform to USB Standard)	
	Consumption	Less than 2W	

B. Spectral Sensitivity Characteristics

1. STC-MBA5MUSB3

2. STC-MCA5MUSB3
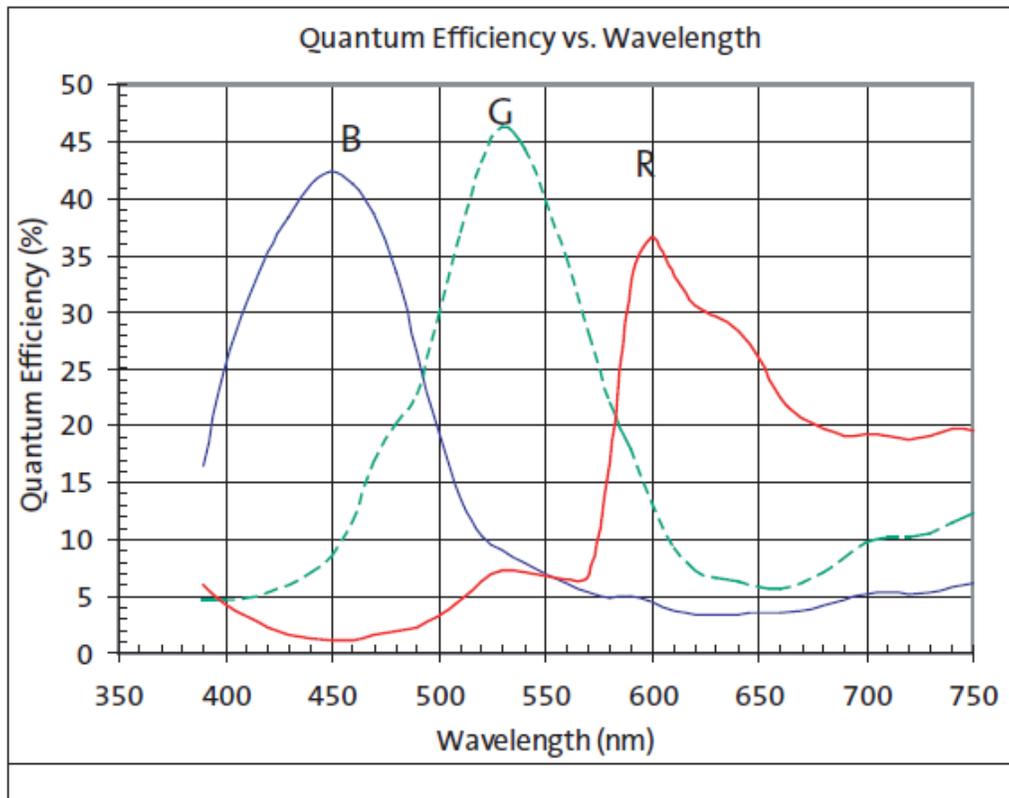
3. NF-50D (IR Cut Filter)

C. Mechanical Specifications

Model Number	STC-MBA5MUSB3	STC-MCA5MUSB3
Dimensions	28 (W) x 28 (H) x 33.8 (D) mm *excluding the connector	
Lens Mount	CS Mount	
Optical Filter	IR Cut Filter	No IR Cut Filter
Optical Center Accuracy	Positional accuracy in H and V directions: +/- 0.5 mm Rotational accuracy of H and V: +/- 0.35 deg.	
Weight	Approximately 38 g	
Interface Connectors	USB Connector: USB3.0 MicroB type I/O Connector: HR10A-7R-6PB (Hirose) or equivalent	

D. Environmental Specifications

Model Number	STC-MBA5MUSB3 / STC-MCA5MUSB3
Operational Temperature	0 ～ +40℃
Storage Temperature	-30 ～+65℃
Vibration	20Hz to 200Hz to 20Hz (5min./cycle), acceleration 10G, 3 directions 30 min. each
Shock	Acceleration 38G, half amplitude 6ms, 3 directions 3 times each
Standard Compliancy	EMS: EN61000-6-2, EMI: EN55011
RoHS	RoHS Compliant

III. Interface Connector Specifications

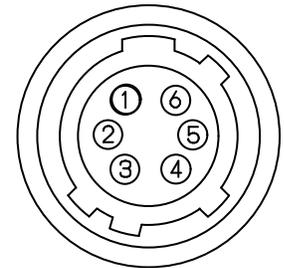I/O Connector
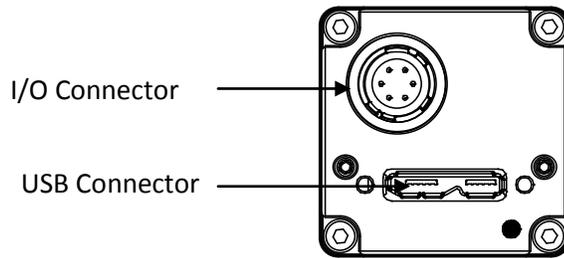
USB Connector

A. USB Connector

USB 3.0 Micro-B Type

B. I/O Connector
- HR10A-7R-6PB (Hirose) or equivalent
- This connector is for input triggers and output signals.
- Use HR10A-7P-6S (Hirose) or equivalent for the cable side.
- The power input of this connector is for output signals, not for the power supply of the camera. The camera power is provided from the USB connector via USB bus which carries +5V. This +5V does not affect the voltage of output signals.

Pin Assignment

Pin No.	Signal Name	IN / OUT	Voltage	
			Low	High
1	GND (IO_GND)	-	0V	
2	Output 2 (IO3)	OUT	Smaller than 0.8 V	+3 to +26.4 V
3	Output 1 (IO2)	OUT	Smaller than 0.8 V	+3 to +26.4 V
4	Input 2 (IO1)	IN	Smaller than 0.7 V	+1.7 to +5 V
5	Input 1 (IO0)	IN	Smaller than 0.7 V	+1.7 to +5 V
6	Power Input (IO_VCC)	-	+3 to +26.4Vdc	

[Back Side]

IV. Input / Output Signal Specifications
   A. Input Signals
       1. Input Signal Functions
           Using the software, the following functions can be set on "Input 1" and "Input 2" of the I/O connector.
           The polarity of Trigger Input and Sub-Trigger Input is selectable.

Function No.	Function Name	Polarity
1)	Disabled (Default)	-
2)	General Input	-
3)	Trigger Input	Positive or Negative
4)	Sub-trigger Input	Positive or Negative

           1) Disabled
               Set when no input signal is necessary.

           2) General Input
               Set high of low level and the user can check the status on the software.

           3) Trigger Input
               Use this function for the trigger signal in the edge preset mode and for the start trigger in the start
               and stop trigger mode.

           4) Sub-trigger Input
               Use this function for the stop trigger in the start and stop trigger mode.

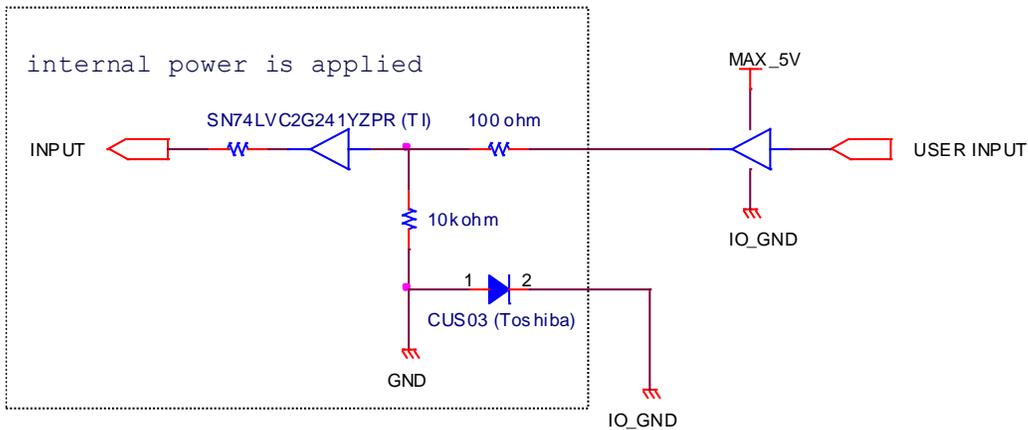   2. Input Signals Electronic Characteristics
           ➢ Input Signal / Input Voltage: 0 to 5V
           ➢ Input Signal / Voltage Level
                   High Level: 1.7V (min.)
                   Low Level: 0.7V (max.)
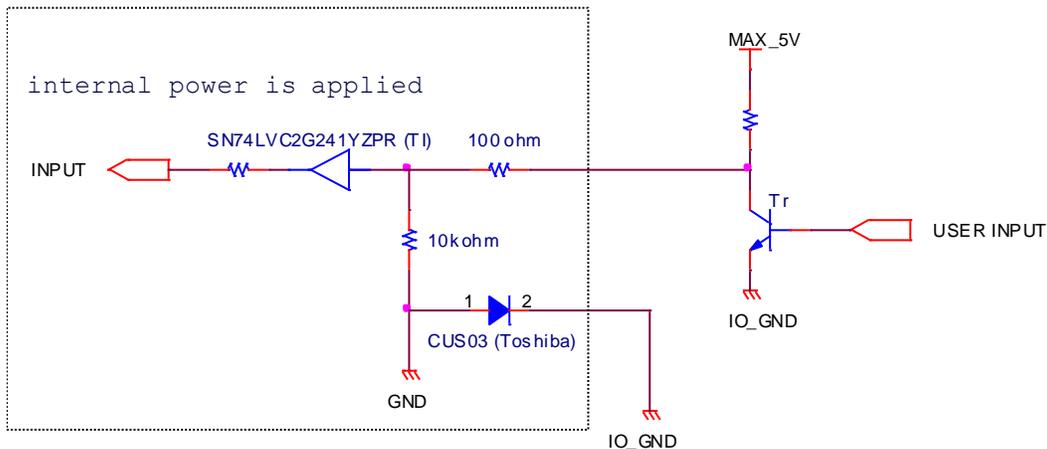
3. Input Signal Circuit
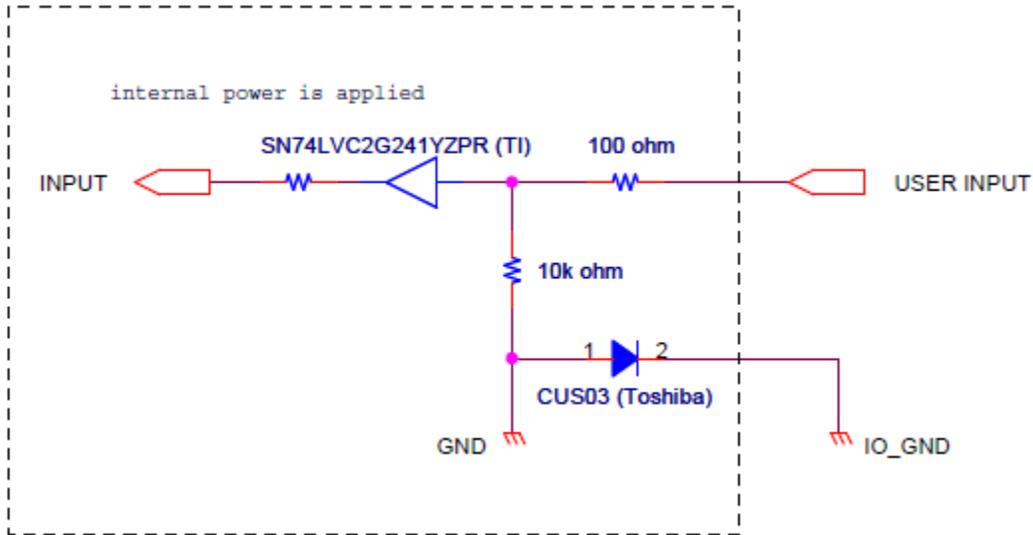
4. Input Signal Circuit Examples

CAMERA

CAMERA

*The voltage applied on "input 1" and "input 2" must be less than or equal to 5V, the absolute maximum input voltage.

B. Output Signals

1. Output Signal Functions

> Using the software, the following functions can be set on "Output 1" and "Output 2" of the I/O connector.
> The polarity of Trigger Output Programmable, Trigger Output Loop Through, Exposure End, CCD Read End Output, Strobe Output Programmable, Strobe Output Exposure and Trigger Valid Out is selectable.
> Negative Polarity is recommended to use to reduce the timing delay due to open drain output.

Function No.	Function Name	Polarity
1)	Disabled (Default)	-
2)	General Output	-
3)	Trigger Output Programmable	Positive or Negative
4)	Trigger Output Loop Through	Positive or Negative
5)	Exposure End	Positive or Negative
6)	Read End Output	Positive or Negative
7)	Strobe Output Programmable	Positive or Negative
8)	Strobe Output Exposure	Positive or Negative
9)	Trigger Valid Out	Positive or Negative

1). Disabled

Set when no output signal is necessary.

2). General Output

Outputs high or low level signal set on the software.

3). Trigger Output Programmable

Outputs the trigger input signal with delay setting applied.

4). Trigger Output Loop Through

Outputs the trigger input sign (with a slight internal delay).

5). Exposure End

Output a signal upon the completion of the first line exposure.

("Trigger Out Delay" and "Trigger Pulse Width" settings are applied.)

6). Read End Output

Output a signal upon the completion of the transfer of a full frame.

("Trigger Out Delay" and "Trigger Pulse Width" settings are applied.)

7). Strobe Output Programmable

Output a signal for the period set with "strobe end delay", starting at the trigger input signal with the addition of "strobe start delay"

8). Strobe Output

Output a signal during the first lien of exposure*.

9). Trigger Valid Out

With the positive polarity setting, high status indicates that the input trigger signal is acceptable. This signal becomes low from the exposure start to the end of image output.

With the negative polarity setting, low status indicates that the input trigger signal is acceptable. This signal becomes high from the exposure start to the end of image output.

* Because this camera is a rolling shutter type, the exposure start timing of each line is not simultaneous.

2. Output Signal Electronic Characteristics

➢ Output Signal / Voltage Level

High Level: Power Input of the I/O Connector (+3 ~ + 26.4 V)
Low Level: Smaller than 0.8 V

➢ Output Signal / Pulse Width

Pulse width is settable using the software.
Please refer to the response timing chart below and set with a sufficient margin.

➢ Output Signal / Response Timing

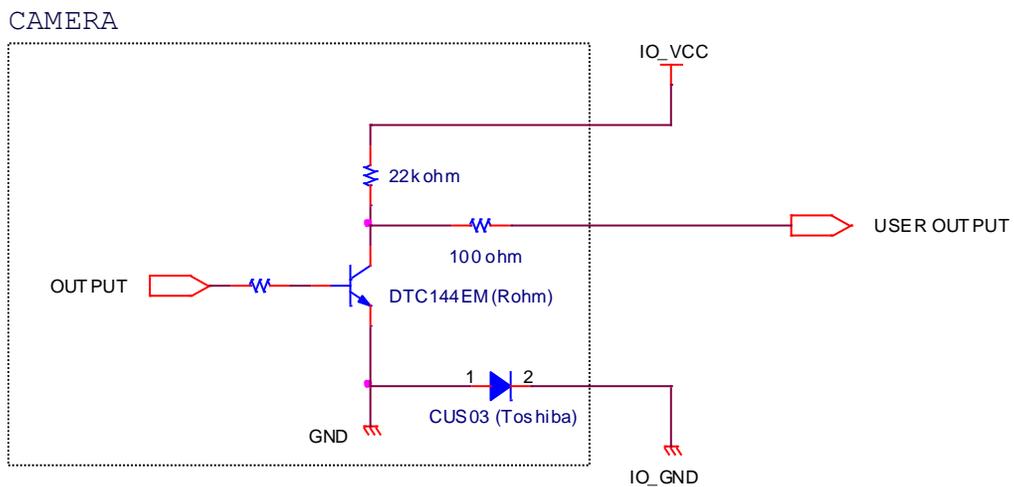The response timing shown below is a reference value measured without an eternal resistance.
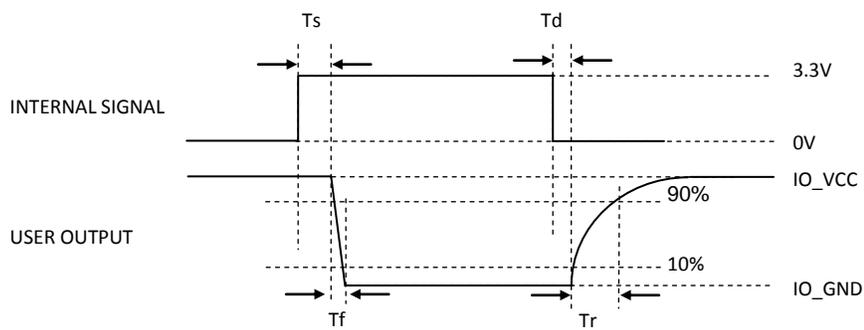
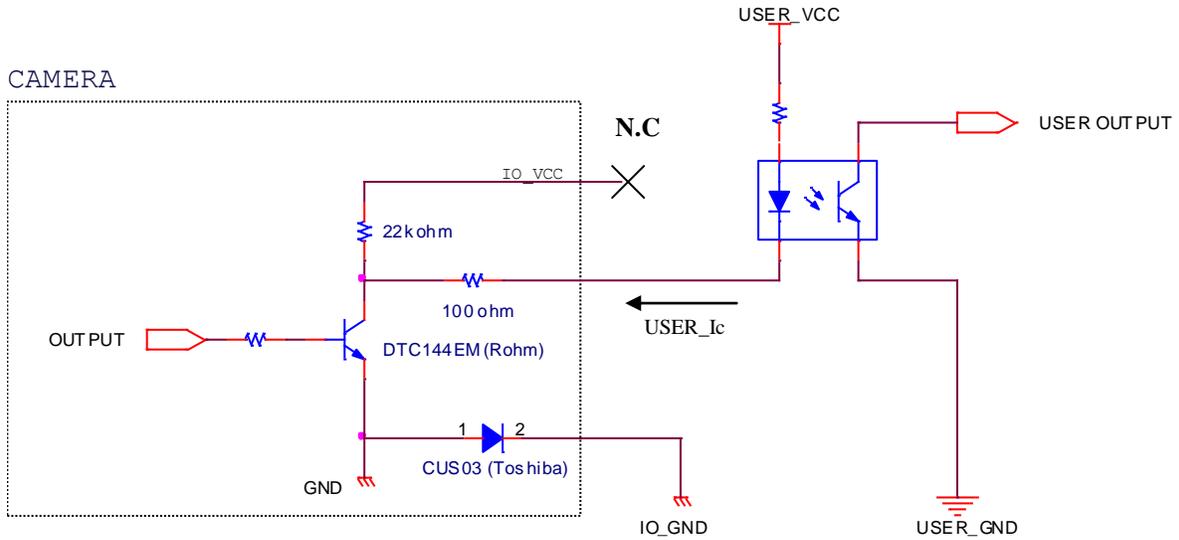|		IO_VCC		
	3.3[V]	5.0[V]	12[V]	24[V]
Td	2.00 [us]	1.82 [us]	1.66 [us]	1.60 [us]
Tr	0.82 [us]	0.84 [us]	1.16 [us]	1.44 [us]
Ts	0.50 [us]	0.56 [us]	0.56 [us]	0.70 [us]
Tf	0.56 [us]	0.66 [us]	1.16 [us]	2.04 [us]

3. Output Signal Circuit
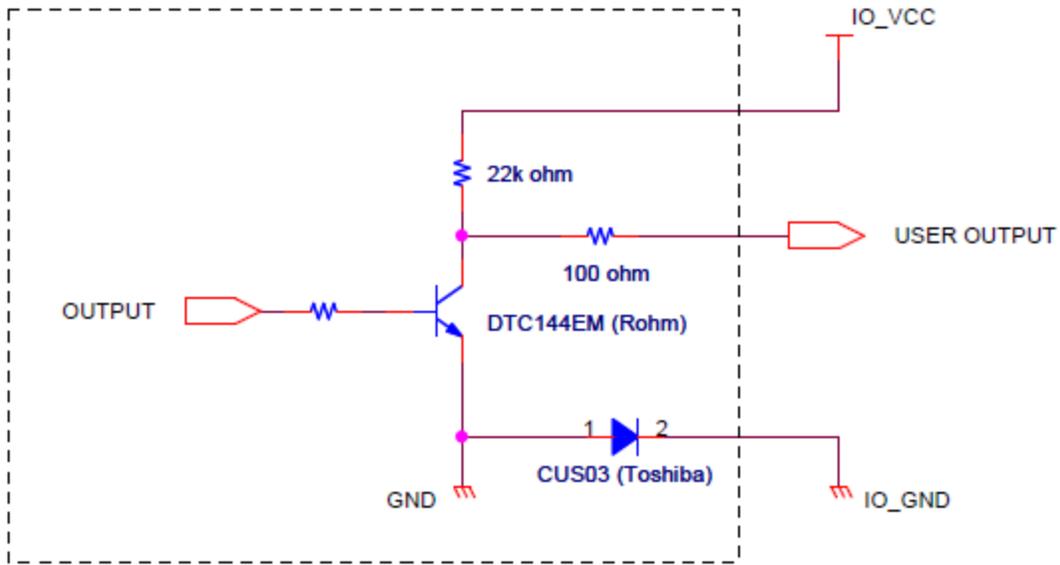
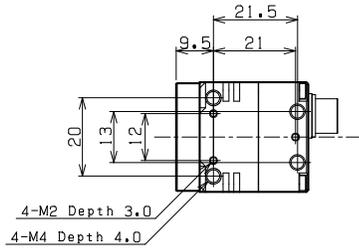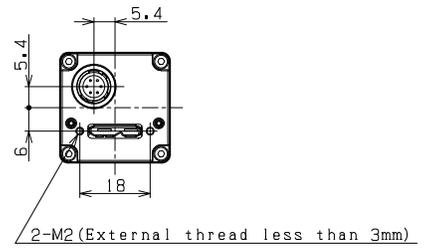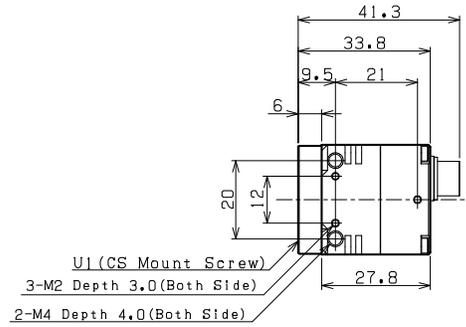4. Output Signal Circuit Examples
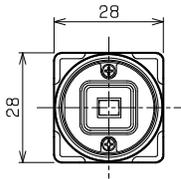

CAMERA

*The voltage applied on the "IO_VCC" must be within the range of +3V to 26.4V.

CAMERA

IO_VCC

N.C

USER_VCC

USER OUTPUT

22kohm

100ohm

OUTPUT

DTC144EM(Rohm)

USER_Ic

1 2

CUS03 (Toshiba)

GND

IO_GND

USER_GND

* When no voltage is applied on "IO_VCC", it can be used as an open collector output.
* The voltage applied on "IO2" and "IO3" (USER_VCC) must be less than or equal to 26.4V.
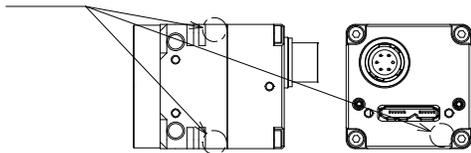* The incoming current to "IO2" and "IO3" (USER_Ic) must be less than or equal to 15mA.
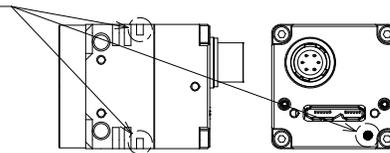
V. Dimensions

3-M2 Depth 3.0
2-M4 Depth 4.0

9.5 21
20 12

28
28

41.3
33.8
9.5 21
6
20 12

U1(CS Mount Screw)
3-M2 Depth 3.0(Both Side)
2-M4 Depth 4.0(Both Side)

27.8

5.4
5.4
6
18

2-M2(External thread less than 3mm)

21.5
9.5 21
20 13 12

4-M2 Depth 3.0
4-M4 Depth 4.0
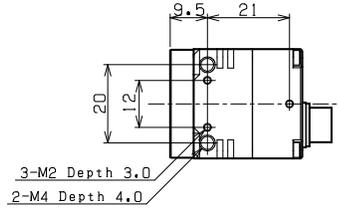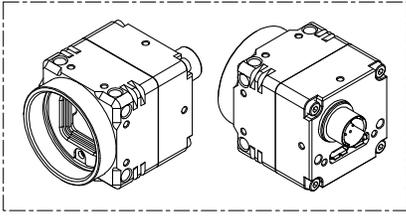
Unit: mm

*How to Identify Monochrome and Color Camera.

STC-MBA5MUSB3   STC-MCA5MUSB3

Revisions

Rev	Date	Changes	Note
.01	April, 5 2012	New document	
.02	April 12, 2012	Corrected Maximum Frame Rate for VGA	
.03	April 20, 2012	Added Interface Connector Specifications	
1.00	October 25, 2012	Full Release Document	

Sensor Technologies America, Inc.

1345 Valwood Pkwy, Suite 320
Carrollton, Texas 75006-6891
TEL (972) 481-9223 FAX (972) 481-9209
URL http://www.sentechamerica.com/

Sensor Technology Co., Ltd.

7F, Harada Center Building
9-17, Naka cho 4chrome
Atsugi-city, Kanagawa
243-0018 Japan
TEL +81-46-295-7061 FAX +81-46-295-7066
URL http://www.sentech.co.jp/

Taiwan Sensor Technology, Inc.

3F-6, No. 9, Aiguo W, Rd,. Jhong Jheng District
Taipei City 100, Taiwan, R.O.C.
TEL 886-2-2383-2331 FAX 886-2-2370-8775
EMAIL: sentech0501@yahoo.com.tw