OMRON

16:9 Format 1080p

STC-HD203 Series Color CMOS Camera

STC-HD203DV (DVI output / C mount)
STC-HD203DV-CS (DVI output / CS mount)

STC-HD203SDI (SDI output / C mount)
STC-HD203SDI-CS (SDI output / CS mount)

Product Specifications and Users Guide

OMRON SENTECH CO., LTD.

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Precautions for safe use

Please read carefully this “Precautions for safe use” before use the camera. Then the camera uses correctly with agreeing with below notes.

In this “Precautions for safe use”, notes divides into “Warning” and “Caution” to use the camera safety and prevent to harm and damage.

⚠ Warning	This shows, assumption for possibility of serious accident leading death or serious injury if ignore this note and camera uses incorrectly.
⚠ Caution	This shows, assumption for possibility of bear the damage or physical damage if ignore this note and camera uses incorrectly.

About Graphic symbols


This symbol shows general prohibition.


This symbol shows completion or instruction.

[Environment / condition]

⚠ Warning	
Do not use flammable or explosiveness atmospheres. This will cause of personal injury or fire.	Do not use for “safety for human body” related usage. This camera is designed for use “do not harm human body immediately” if by any chance the camera has malfunction.
⚠ Caution	
Use and store under specified environmental conditions (Vibration, shock, temperature, humidity) in the specifications for this camera. This will cause of fire or damage the camera.	

[Installation and cable wiring]

⚠ Wa
Do not use with out of power voltage range that is specified in the specifications for this camera. This will cause of fire, electrification or malfunction.

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⚠ Caution	
The camera housing is not connecting to 0 V line of camera inside circuit. There is a risk of short circuit between camera inside ciurcuit and frame ground through other devices. This will cause of malfunction.	It is necessary to wiring and mounting that is specified in the specifications for this camera. This will cause of fire or malfunction.
It is necessary to wiring with turn off the camera. This will cause of electrification or malfunction.	It is necessary to mounting the camera without stress for the cable. This will case of electrification or fire.

[Usage instruction]

⚠ Warning	
Do not touch the terminal and PCB board While turn on the camera. This will cause of electrification or accident caused by malfunction.	Do not put combustibles near the camera. This will cause of fire.
Do not use without usage that is specified in the specifications for this camera. This will cause of personal injury or malfunction.	Do not push metals including screw driver into radiation holes. This will cause of electrification or malfunction.

⚠ Caution	
Do not push contamination into opening of the camera. This will cause of electrification or malfunction.	Do not block the radiation holes. This will cause of fire due to increase the camera inside temperature.

[Maintenance]

⚠ Caution	
Do not disassemble or repair the camera. This will cause of fire, electrification or malfunction.	It is turn off the camera when maintaining or inspecting the camera. This will cause of electrification.

[Disposal]

⚠ Ca
It is necessary to dispose as industrial waste.

1 Product Precautions

- Do not give shock to the camera.
- Do not haul or damage the camera cable.
- Do not wrap the camera with any material while using the camera. This will cause the internal camera temperature to increase.
- When the camera moving or using the place that temperature difference is extreme, countermeasure for dew condensation (heat removal / cold removal) is necessary.
- While the camera is not using, keep the lens cap on the camera to prevent dust or contamination from getting in the sensor or filter and scratching or damaging it.
  Do not keep the camera under the following conditions.
  - In wet, moist, high humidity or dusty place
  - Under direct sunlight
  - In extreme high or low temperature place
  - Near an object that releases a strong magnetic or electric filed
  - Place with strong vibrations
- Apply the power that satisfies the specified in specifications for the camera.
- The defective pixels may appear due to the sensor characteristics.
- Use below recommend materials (or equivalent materials) to clean the surface of glass.
  - Air dust: Non Freon air duster (NAKABAYASHI Co., LTD.)
  - Alcohol: Propan-2-ol (SAN'EI KAKO Co., LTD.)
  - Non-woven: nikowipe clean room (NKB)
- Use a soft cloth to clean the camera.

2 Warranty

■Warranty period

One year after delivery (However, the camera had malfunction with camera uses correctly)

In below case for a fee even within warranty period.

- The malfunction caused by incorrect usage, incorrect modify or repair.
- The malfunction caused by external shock including the camera dropping after delivery the camera.
- The malfunction caused by fire, earthquake, flood disaster, thunderbolt struck, other natural disaster or wrong voltage.

■Warranty coverage

Exchange or repair the malfunction camera if the malfunction is occurred by our responsibility.

"Warranty" mean is warranty for the delivered camera itself. Please accept the induction damage by the camera malfunction is not included.

3 Introduction

This document describes the specification of the following cameras:

STC-HD203DV / STC-HD203DV-CS	(DVI output model)
STC-HD203SDI / STC-HD203SDI-CS	(SDI output model)

3.1 Features

- **1080p CMOS Sensor**
- **DVI / SDI Output**
- **Camera adjustment with OSCD (On Screen Character Display) through Remoter Controller (Option)**
- **Configurable many parameters through Control Software**
- **Eight configurable DSP can be saved**
- **Wide Dynamic Rage (ATR-EX)**
- **Defective Pixel Correction (JTACtrl v1.02 or later)**

3.2 Naming Method

STC-HD203xx

Back Panel
DV: DVI Output
SDI: SDI Output

3.3 Peripheral Equipment

We provide as follow peripheral equipment as option.

+12V DC Power Supply: UN310-1210
Remote Controller: RC-HD133
Communication Tool (communicate through USB port on PC): JIG-USB-HD
Control Software: JTACtrl (Free)

Note: This camera may become hot when operating 1(
housing.

4 Specifications

4.1 Electronic specifications

4.1.1 STC-HD203DV / STC-HD203DV-CS

Model Number			STC-HD203DV	STC-HD203DV-CS
Image Sensor			1/2.8" 2.3M Progressive Color CMOS (SONY: IMX136)	
Shutter Type			Rolling Shutter	
HD Active Picture Elements			1,920 (H) x 1,080 (V)	
Cell Size			2.8 (H) x 2.8 (V) µm	
Sync. System			Internal	
Video Output			DVI 1.0 conformity RGB 1080P60 / 1080P59.94 / 1080P50 / 1080P30 / 1080P29.97 / 1080P25 / 720P60 / 720P59.94 / 720P50 (**Default: 1080P60)**	
Minimum Scene Illumination			0.6 Lux (AGC ON) @ F1.2	
Camera Functions				
	ALC		Can be configured via the UART communication with auto electronic shutter and AGC	
	Shutter Speed		Adjustable shutter speed via the UART communication (AEE) (**Default: Auto)**	
		Extended	Extend shutter frame unit (Up to 2.55 seconds)	
		High Speed	From 1/10,000 seconds (*1)	
	Gain		AGC or Fixed gain selectable via the UART communication **(Default: AGC)** 0 to 45 dB	
	Gamma		Selectable gamma through 5 preset (one preset is manual / 0.45 / 0.6 / 0.8 / 1) Selectable gamma via the UART communication (**Default: manual)**	
	White Balance		Auto white balance / manual white balance / push to set white balance Selectable white balance via the UART (**Default: Auto white balance)**	
	WDR		Wide Dynamic Range OFF/ON (**Default: OFF)** WDR enable via the UART communication	
	Mirror Image		Normal image / horizontal flip / vertical flip / horizontal vertical flip (180 degree rotation) (**Default: Normal image)**	
	Picture Modes		8 user preset mode, Normal picture mode or pseudo color mode can be selectable Selectable picture mode via the UART communication **(Default: Preset 0)**	
	Line Generator		Both horizontal and vertical with all available colors (Line number: 2) Adjustable thickness via the UART communication (**Default: Disable**)	
	Shadow Mask Generator		Both horizontal and vertical with shading level adjustment via the UART communication (**Default: Disable**)	
	Still Image		Selectable Live image or freeze image via the UART communication	
	Communication		+3.3V UART communication via 3.5Φ Stereo Jack (Baud rate: 38,400bps / 19,200bps / 9,600bps)	
	Character Generator		Built-in character generation function via the UART communication	
	Defective Pixel Collection		Support	
Power	Input Voltage			
	Consumption			

Default: **Bold**

(*1) Longest exposure time is depending on video output f

4.1.2 STC-HD203SDI / STC-HD203SDI-CS

Model Number			STC-HD203SDI	STC-HD203SDI-CS
Image Sensor			1/2.8" 2.3M Progressive Color CMOS (SONY: IMX136)	
Shutter Type			Rolling Shutter	
HD Active Picture Elements			1,920 (H) x 1,080 (V)	
Cell Size			2.8 (H) x 2.8 (V) µm	
Sync. System			Internal	
Minimum Scene Illumination			0.6 Lux (AGC ON) @F1.2	
Video Output			3G-SDI (Physical layer: SMPTE 424M, Data Mapping: SMPTE 425M Level-A Compliant), 4:2:2 YCbCr 10bit 1080P60 / 1080P59.94 / 1080P50 HD-SDI (SMPTE292M Compliant) 4:2:2 YCbCr 10bit 1080P30 / 1080P29.97 / 1080P25 720P60 / 720P59.94 / 720P50 **(Default: 1080P60)**	
Camera functions				
	ALC		Can be configured via the UART communication with auto electronic shutter and AGC	
	Shutter Speed		Adjustable shutter speed via the UART communication (AEE) (**Default: Auto)**	
		Extended	Extend shutter frame unit (Up to 2.55 seconds)	
		High Speed	From 1/10,000 seconds (*1)	
	Gain		AGC or Fixed gain selectable via the UART communication **(Default: AGC)** 0 to 45 dB	
	Gamma		Selectable gamma through 5 preset (one preset is manual / 0.45 / 0.6 / 0.8 / 1) Selectable gamma via the UART communication (**Default: manual)**	
	White Balance		Auto white balance / manual white balance / push to set white balance Selectable white balance via the UART (**Default: Auto white balance)**	
	WDR		Wide Dynamic Range OFF/ON (**Default: OFF)** WDR enable via the UART communication	
	Mirror Image		Normal image / horizontal flip / vertical flip / horizontal vertical flip (180 deg. rotation) (**Default: Normal image)**	
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	Line Generator		Both horizontal and vertical with all available colors (Line number: 2) Adjustable thickness via the UART communication (**Default: Disable**)	
	Shadow Mask Generator		Both horizontal and vertical with shading level adjustment via the UART communication (**Default: Disable**)	
	Still Image		Selectable Live image or freeze image via the UART communication	
	Communication		+3.3V UART communication via 3.5Φ Stereo Jack (Baud rate: 38,400bps / 19,200bps / 9,600bps)	
	Character Generator		Built-in character generation function via the UART communication	
	Defective Pixel Collection		Support	
Power	Input Voltage		+9 to +15 Vdc (Typical: +12 Vdc)	
	Consumption		4.4 W (Typical)	

Default: **Bold**

(*1) Longest exposure time is depending on video output f

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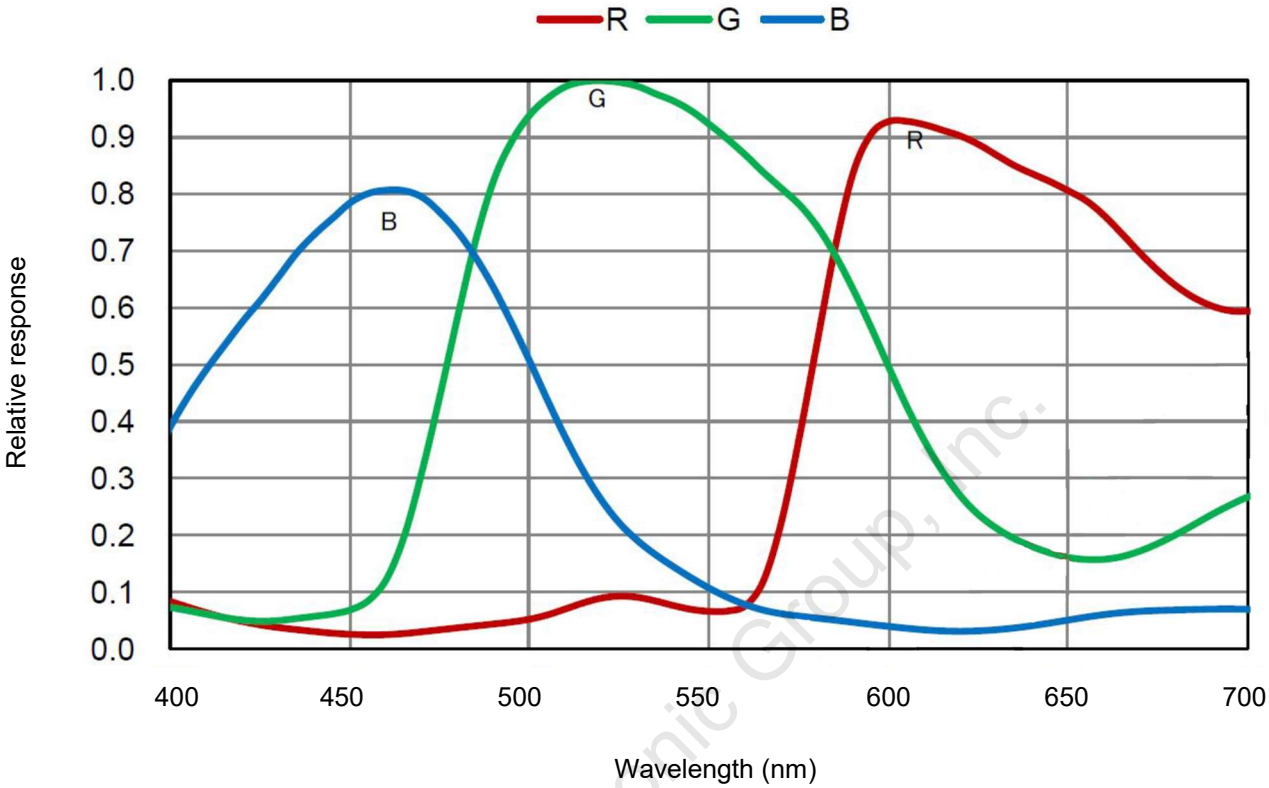
4.2 Spectral Sensitivity Characteristics



4.3 Mechanical Specifications

4.3.1 STC-HD203DV / STC-HD203DV-CS

Model Number	STC-HD203DV	STC-HD203DV-CS
Dimensions	40 (W) x 40 (H) x 48.9 (D) mm (*1)	40 (W) x 40 (H) x 43.9 (D) mm (*1)
Optical Filter	IR cut filter with OPLF	
Material	Aluminum (AC)	
Lens Mount (*2)	C Mount	CS Mount
Dimensions	Internal	
Connectors	Video Output Connector: HDMI Connector Power Input Connector: DC power jack (*3) Remote Control / UART Communication Connector: 3.5Φ Stereo Jack	
Camera Mount Screws	Two 1/4” Tripod screw holes: (One on top and bottom plate) Eight M4 screws holes: (Four on top and bottom plate)	
Weight	Approximately 116 g	

(*1) Excluding connectors
(*2) Recommend lens: More than F2.8 (Close side)
(*3) Please use 2.1mm plug for DC power plug

4.3.2 STC-HD203SDI / STC-HD203SDI-CS

Model Number	STC-HD203SDI	STC-HD203SDI-CS
Dimensions	40 (W) x 40 (H) x 48.9 (D) mm (*1)	40 (W) x 40 (H) x 43.9 (D) mm (*1)
Optical Filter	IR cut filter with OPLF	
Material	Aluminum (AC)	
Lens Mount (*2)	C Mount	CS Mount
Dimensions	Internal	
Connectors	Video Output Connector: BNC Connector Power Input Connector: DC power jack (*3) Remote Control / UART Communication Connector: 3.5Φ Stereo Jack	
Camera Mount Screws	Two 1/4” Tripod screw holes: (One on top and bottom plate) Eight M4 screws holes: (Four on top and bottom plate)	
Weight	Approximately 136 g	

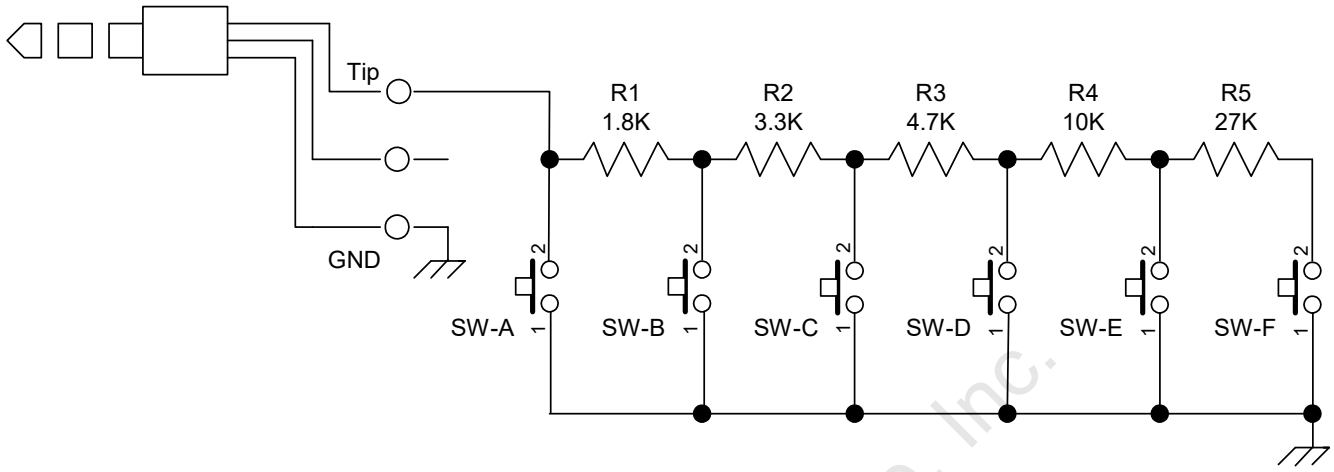
(*1) Excluding connectors
(*2) Recommend lens: More than F2.8 (Close side)
(*3) Please use 2.1mm plug for DC power plug

4.4 Environmental Specifications

Model Number	STC-HD203DV / ST
Operational Temperature / Humidity	Envi
Storage Temperature / Humidity	Envi
Vibration	20 Hz to 200 Hz to 2(
Shock	Acceleration 3
Standard Compliancy	
RoHS	

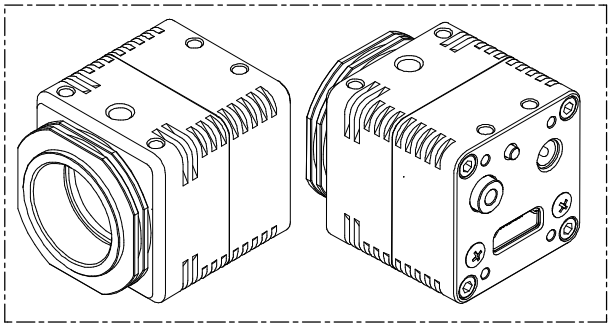
4.5 External Control Specification

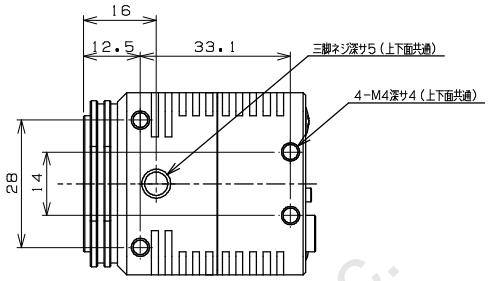
Circuit Diagram of SW Board to connect 3.5φ Stereo Pin Jack

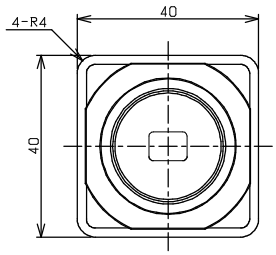


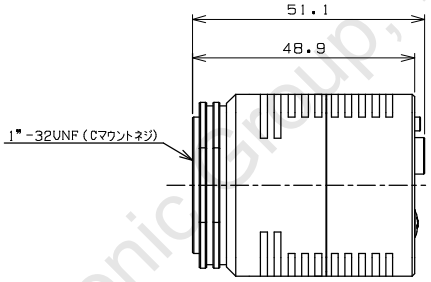
5 3. Dimensions

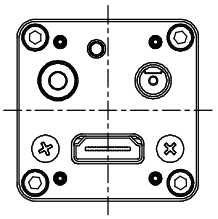
5.1 STC-HD203DV

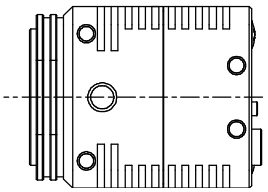






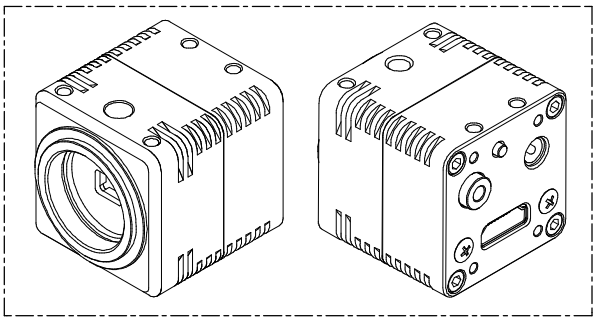


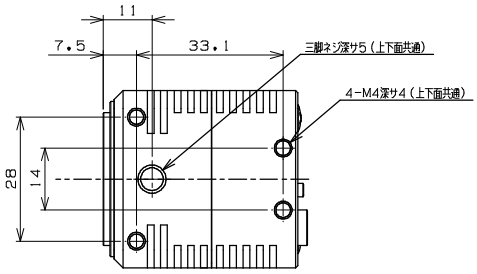


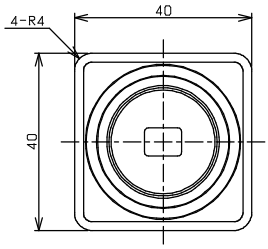


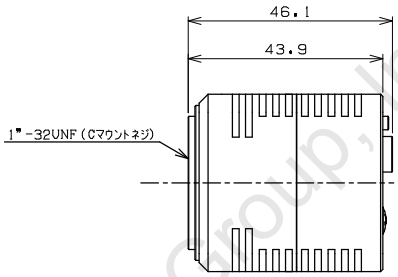
unit: mm

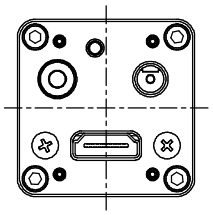
5.2 STC-HD203DV-CS

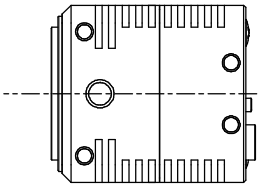






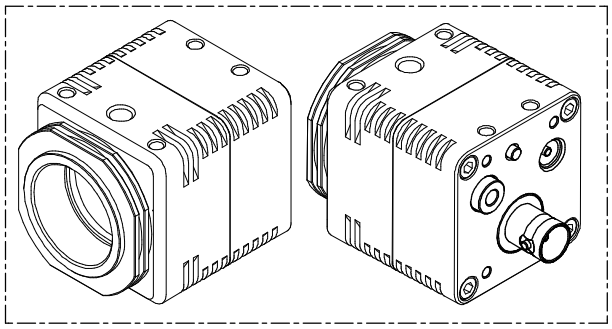


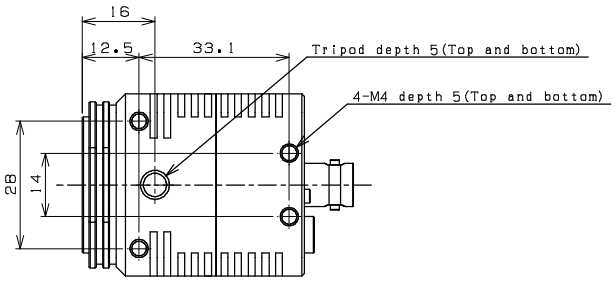


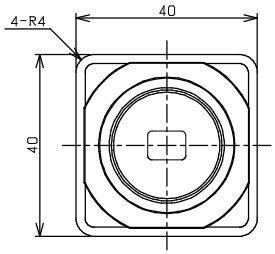


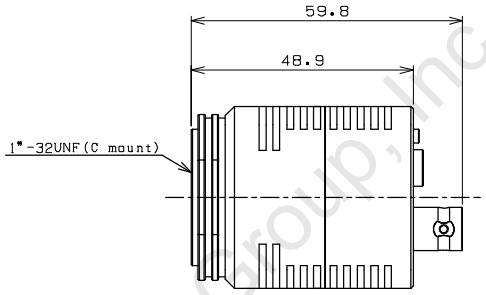
unit: mm

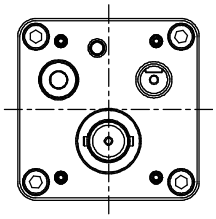
5.3 STC-HD203SDI

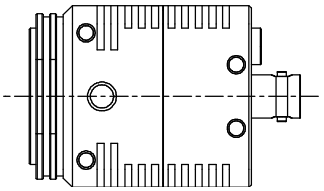






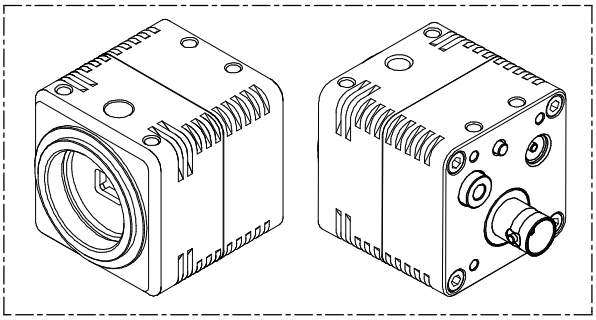


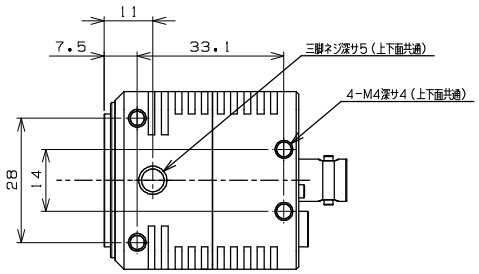


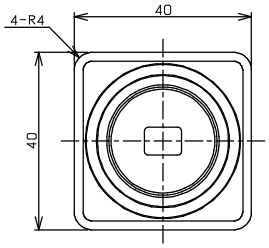


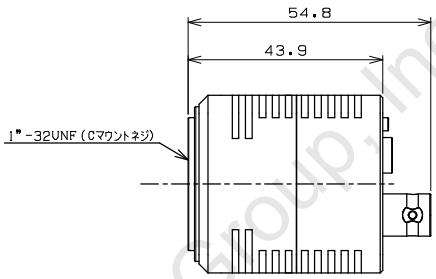
unit: mm

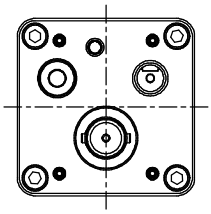
5.4 STC-HD203SDI-CS

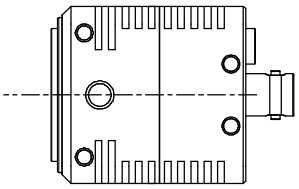












unit: mm

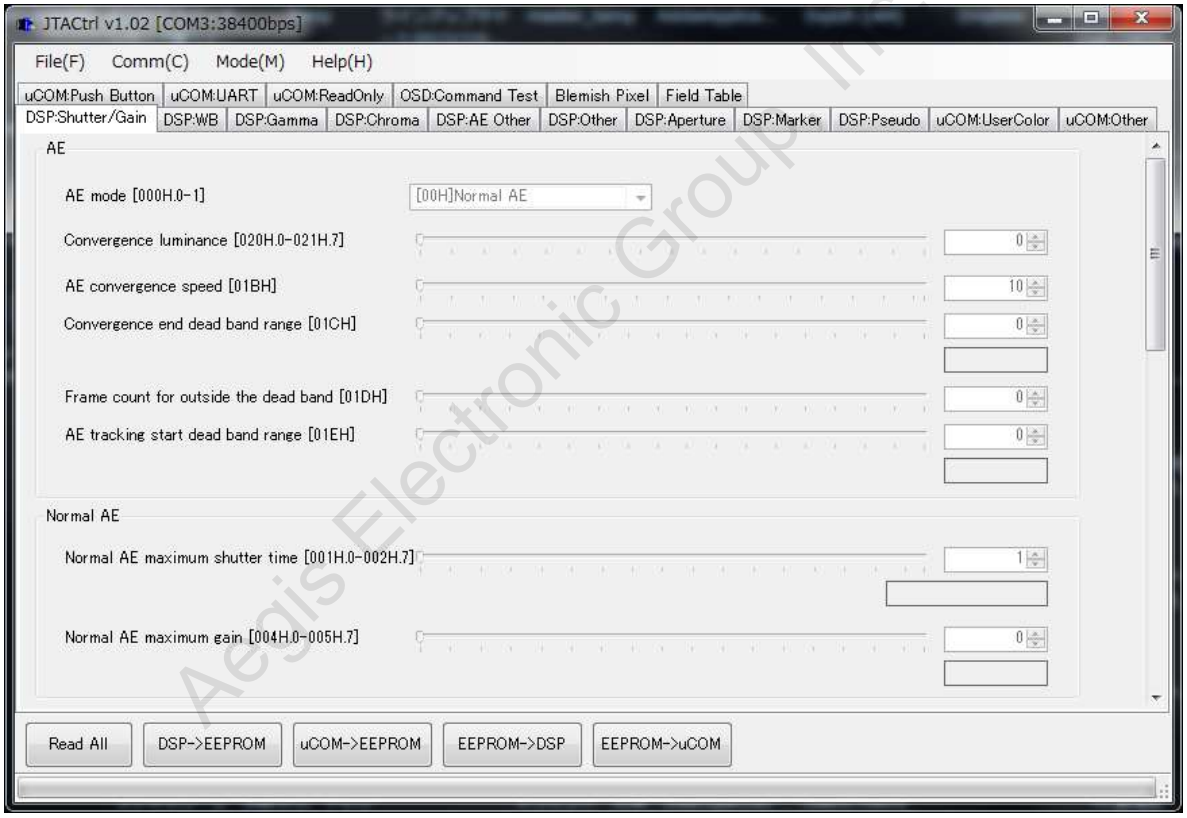
6 Control Software User's Guide

6.1 System Requirements

+12V DC Power Supply: UN310-1210
Communication Tool (Communicate through USB port on PC): JIG-USB-HD
Control Software: JTACtrl

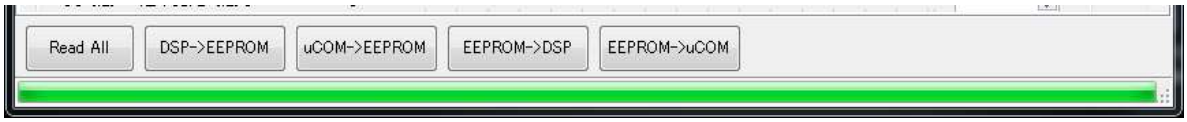
6.2 Basic Operating Procedure

Connect the power supply with the camera, and connect the Communication Tool with PC via USB cable
After installing JTACtrl, control software can be launched from JTACtrl.exe.



Select the COM port number through Comm(C) => Port Setting
Click Read All to read all of register values
All of camera setting can be configurable tl

6.3 Button Description



Read All

Read out All of DPS register and uCOM register values on camera. Please execute this button when turning on the camera every time.

DSP -> EEPROM

Save the DSP register values (that values are on DSP tab) into the EEPROM.

uCOM -> EEPROM

Save the uCOM register values (that values are on uCOM tab) into the EEPROM.

EEPROM -> DSP

Read the DSP register values on EEPROM.

EEPROM -> uCOM

Read the uCOM register values on EEPROM.

6.4 The Difference of uCOM register and DSP register

Mainly Video control functions are in the DSP register area. The communication settings and other functions as the button setting are in the uCOM register. DSP has the eight User presets; User can load each DSP Preset for each application.

6.5 Functional Description

DSP: Shutter/GainTab

AE

AE mode

Normal AE, Long AE, USER Mode can be selectable. If User likes to use Fixed Gain, Fixed Shutter, USER mode should be selected.

Convergence luminance

This setting is target luminance at which AE has converged to the appropriate luminance.

AE convergence speed

This setting is used to set the time to be taken for the exposure amount appropriate for the image to be established.

Convergence end dead band range

This setting is used to set the range in which convergence is to be identified. As for the detail, please refer to the another chapter

Frame count for outside the dead band

When the absolute value of the error amount is below the setting and the same status has continued for frame number.

AE tracking start dead band range

This function is used to ensure that the AE oper
object has passed cut across the shooting scree
the AE error amount is above the setting and tl
band frame number. As for the detail, please refe

Normal AE

When Normal AE is selected, these registers are available.
As for the detail, please refer to the another chapter.

Long AE

When Long AE is selected, these registers are available. As for the detail, please refer to another chapter.

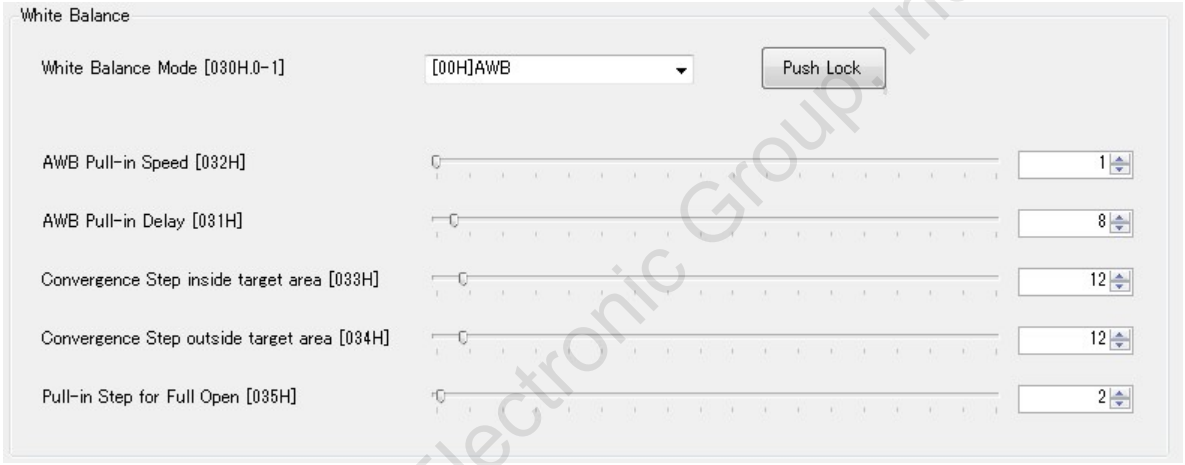
Priority Mode

When Normal AE or Long AE is selected on AE M
Gain or Fixed Shutter, this Priority Mode should b
registers are available.

USER Mode

When User likes to use Fixed Gain or Fixed Shutter, this mode can be used when USER mode is selected on AE mode. When USER Mode is selected, these registers are available. As for the detail, please refer to another chapter.

DSP: WB



White Balance

AWB, Full-Open, AWB Hold, USER Mode can be selectable. As for the detail, please refer to another chapter.When User likes to use Fixed White Balance, please select USER Mode.

AWB Pull-in Speed

Pull-in speed of AWB mode is set in the number of frames specified by this setting. This setting might be available when Auto or Full Open is selected on White Balance Mode. Unit: Frame number

AWB Pull-in Delay

When a status outside the dead band has beer
consistency in the number of frames specified by

Convergence Step inside target area

The AWB pull-in steps inside target area can b
white balance is faster.

Convergence Step outside target area

The AWB pull-in steps outside target area can l
white balance is faster.

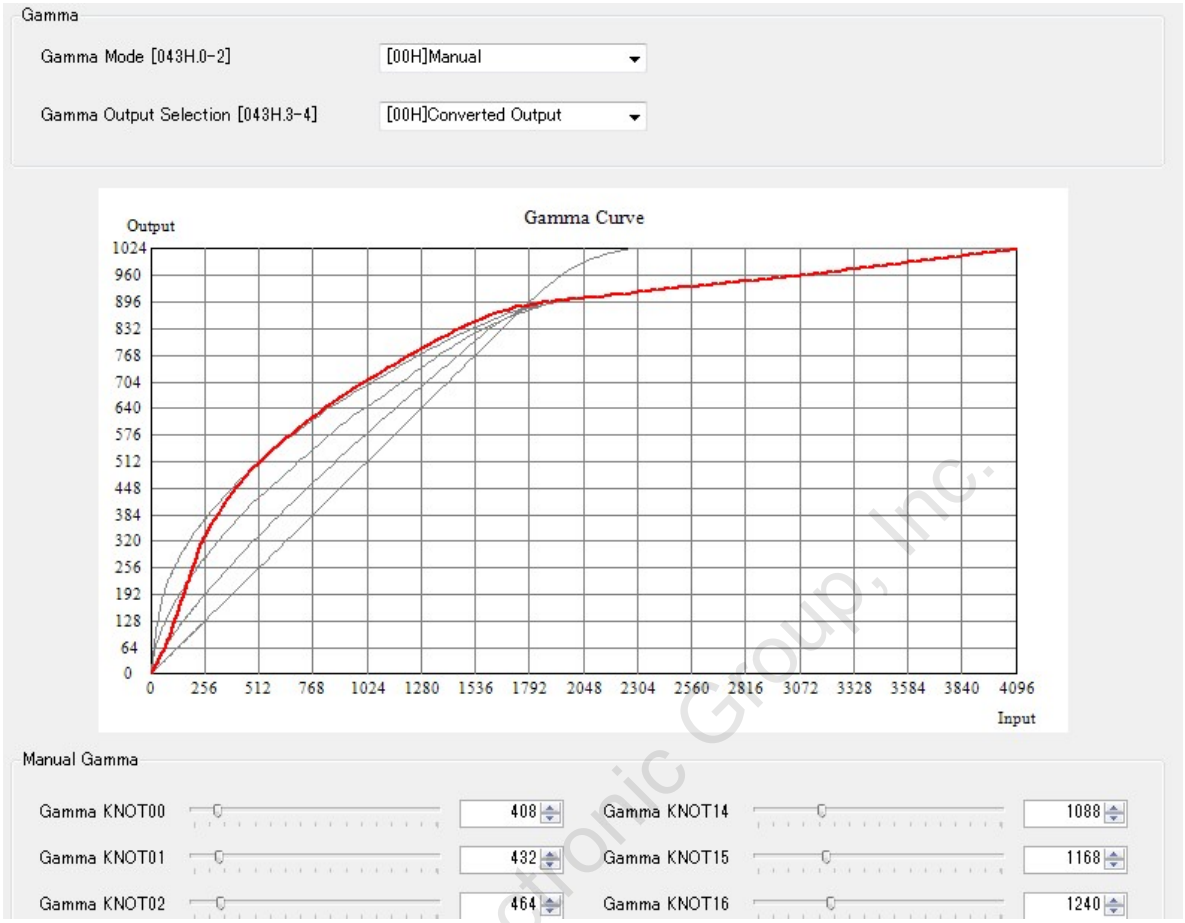
Pull-in Step for Full Open

When set the number of steps for full open mode pull-in, the convergence speed is faster.

USER Mode

When White Balance mode is on USER mode. Fixed White Balance can be set. When USER Mode is selected, these registers are available.

DSP: Gamma



Gamma Mode

Manual or Preset value (0.45,0.6,0.8,1.0) can be selected. When Manual is selected, Gamma curb that was defined on Manual Gamma part are reflected.

Gamma Output Selection

Gamma Converted Output or Gamma un-Converted Output can be selected. When Gamma Converted Output is selected, Output video image output from Gamma Mode's value.

DSP: Chroma

Hue Adjustment

The hue can be adjusted.

Saturation Adjustment

The Saturation can be adjusted.

DSP: AE Other

Flickerless mode

Flicker is generated when shooting under fluorescent lights whose flickering periods differ from the shutter periods. This is function capable of reducing the flicker by adjusting the shutter speed(Auto,50Hz,60Hz) so as to match the light-emitting frequency of the fluoresc

Photometry mode

In order to achieve the optimum luminance, th exposure time to achieve the optimum luminanc using 9 frames (3 horizontal x 3 vertical frames) a it adds up the total number of luminance levels, former modes are the average photometry, weigl

DSP: Other

Resolution/FrameRate

Select the output video format.

Image Output Inversion

Select the H,V Inversion image.

Sharpness Gain

Set the Sharpness value.

ATR-EX function

when both low-luminance areas and high-luminance areas exist on one screen, AE controls the exposure in such a way that the exposure is appropriate for the high-luminance areas, loss of dark detail will occur; conversely, overexposure will occur if AE controls the exposure so that it is appropriate for the low-luminance areas. This happens because the luminance of images tends toward either the high-luminance side or low-luminance side.

Both overexposure and loss of dark detail can be avoided and images with the appropriate contrast can be achieved by compressing the low- and high-luminance areas for the image components in one field toward medium luminance and compensating the high-visibility medium-luminance areas toward the appropriate gray scale. The function used to achieve this is called ATR-EX (Augmenting Tone Reproduction) or WDR (Wide Dynamic Range).

Color/Black and white

Select the Color or Monochrome image.

Contrast

Set the Contrast value.

RGB offset

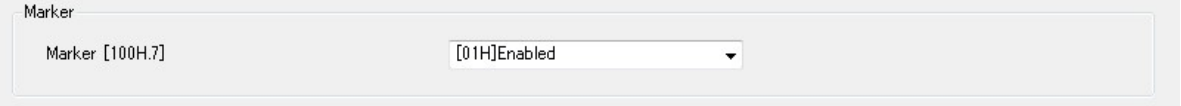
Set the offset on Video image.

DSP: Aperture

The aperture compensation function is used to enhance the perceived resolution by emphasizing the edge areas of the images. To emphasize the edges, increase the aperture compensation gain value. However, if this gain is increased too much, noise which manifests as a roughness of the images becomes noticeable. Adjust the parameter changes while monitoring the actual images.

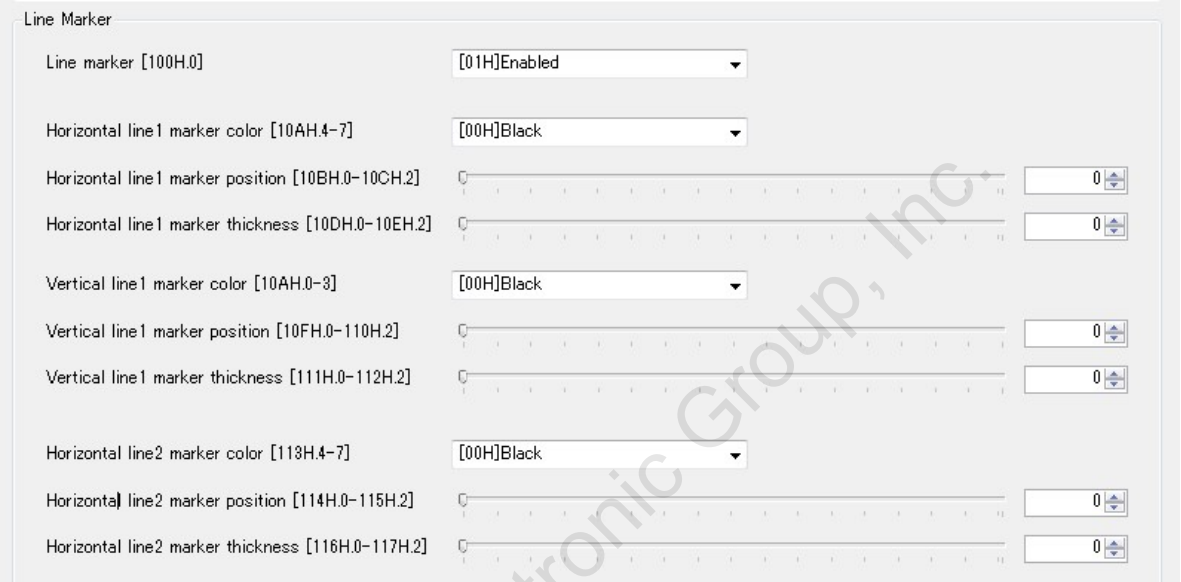
DSP: Marker

Set the Horizontal/Vertical line marker and shadow.



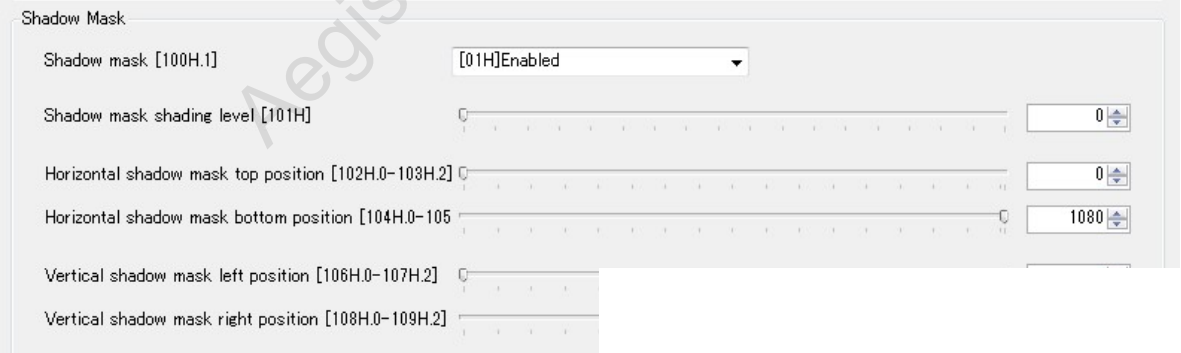
Marker

Set the line marker and shadow.



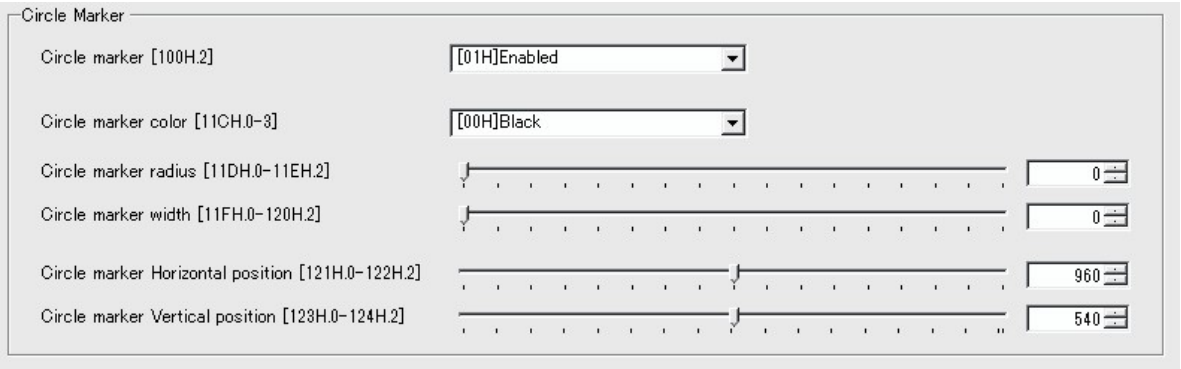
Line Marker

Set the color, position, size of two line markers.



Shadow Mask

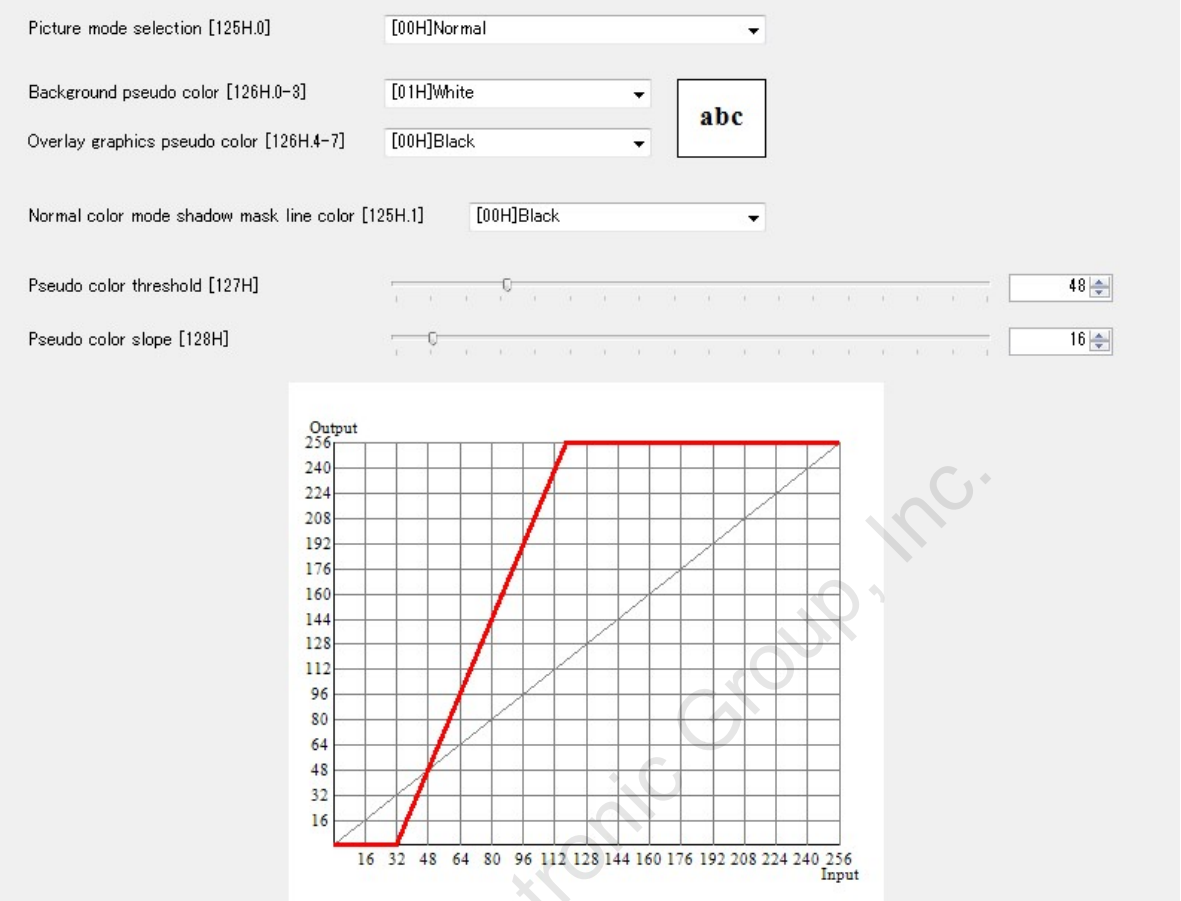
Set the shadow mask on top, bottom, left, right s



Circle Marker

Set the color, position, size (circle and line) of the circle maker.

DSP: Pseudo



Picture mode selection

Select the Normal color or Pseudo color mode. When Pseudo is selected, bipolarization video image is output.

Background pseudo color

Convert the background image into selected color.

Over graphics pseudo color

Convert the Over graphics image into selected color.

Normal color mode shadow mask line color

Select the line color of shadow mask from black or Over graphics pseudo color.

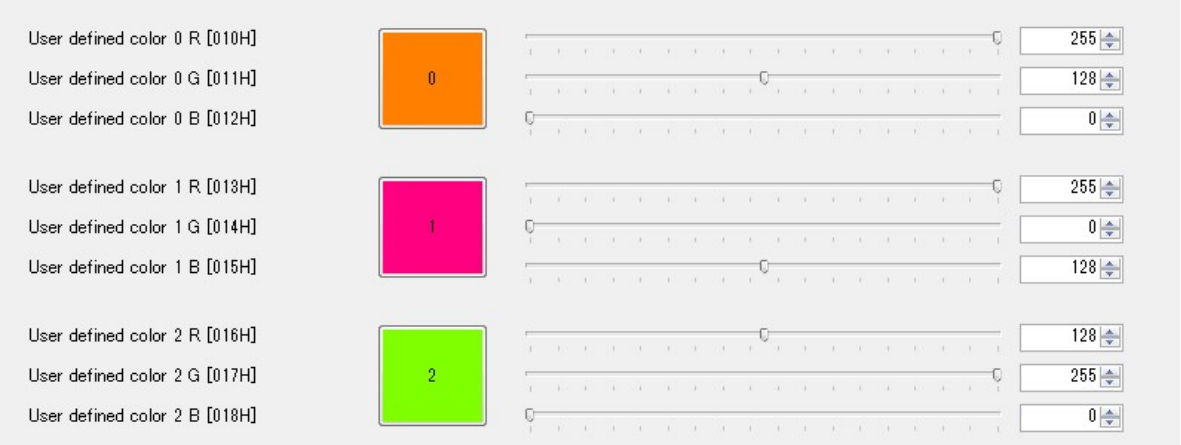
Pseudo color threshold

Set the threshold to bipolarize the input video im

Pseudo color slope

Set the slope of bipolarization.

uCOM: User Color



Define the eight color table. The defined color can be used as Pseudo color and Line marker..

uCOM: Other

User Preset

Set the DSP setting from eight Preset0 to Preset7. All of DSP setting parameter may reflect after readout.

Digital Zoom

Set the Digital Zoom.

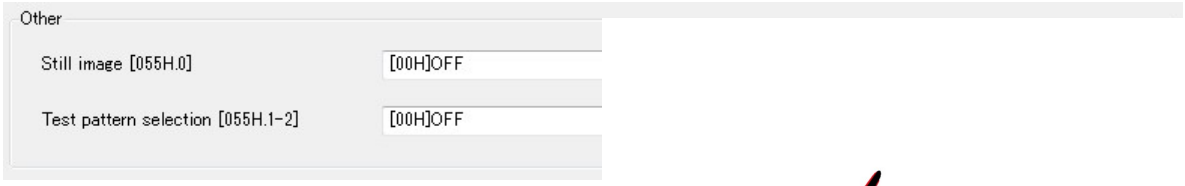
Digital zoom pan

Set the offset on horizontal direction.

Digital zoom tilt

Set the offset on vertical direction.

Set the OSD function, actual OSD control can be through remote controller.



Still image

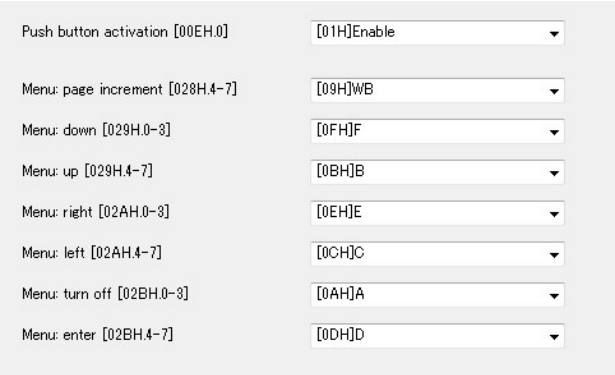
Set the Still video image.

Test pattern selection

Set the test pattern on video output.

uCOM: Push Button

Button

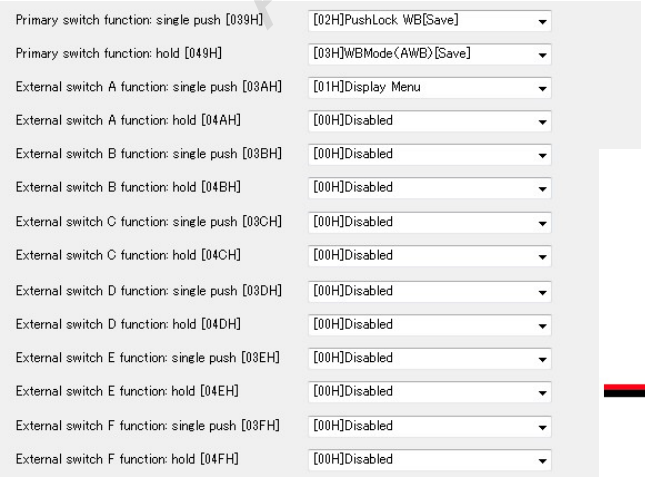


Single push/Hold can be assigned on remote controller's push button.

Marker shadow

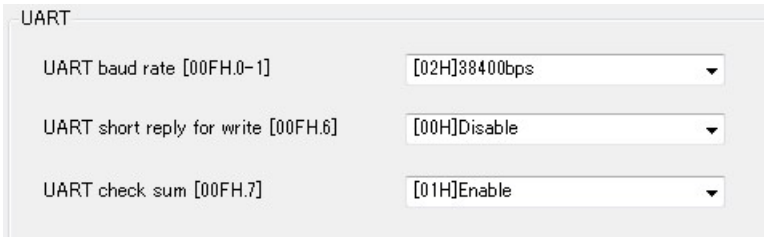
Remote controller can set the Marker and Shadow parameters.

Push button (single push/hold)



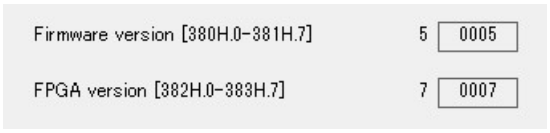
Select the function for each putton.As for the sel

uCOM: UART



Set the camera communication.

uCOM: ReadOnly

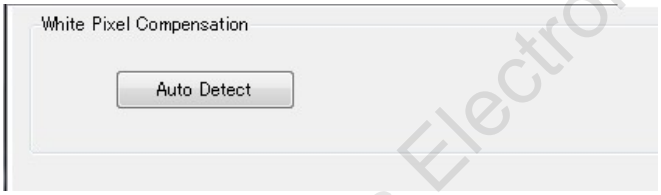


Read the Firmware and FPGA revision on the camera.

OSD Command Test

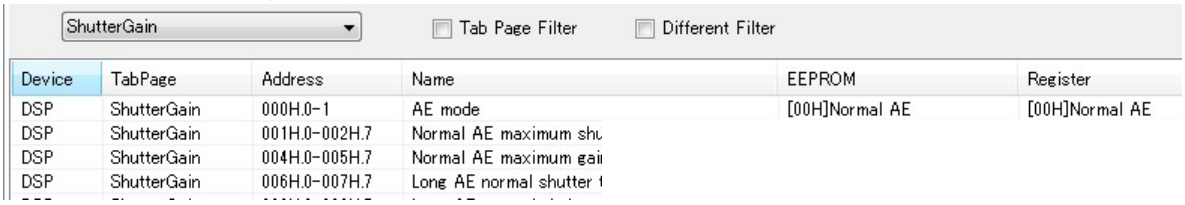
画面の指定した位置に文字を表示することが可能です。詳細は OSCD (On Screen Character Display) コマンドを参照ください。

Blemish Pixel



Correct the white pixels to interpolated pixel data automatically.

Field: Table



All of register setting from the registers.

7 The communication protocol specifications

7.1 Communication settings

Setting	Value
Baud rate	9,600 bps / 19,200 bps / 38,400 bps (Default)
Data bit	8 bits
Parity	None
Stop bit	1 bit
Flow control	None

7.2 Communication format

The format for the sending / receiving data between the PC and the camera is in below:

SOF 8bits	Command 8bits	Direction 1bit	Data length 15bits	Data [Data length] byte (Variable)	Check sum 8bits	EOF 8bits

Details for the format

	Details
SOF	Start of the Frame. This value is always “0x02”.
Command	Command Code Refer to: "The Camera Control Command"
Direction	"0": Reading or receiving data from the camera is always a "0" value. "1": Writing or sending data to the camera is always a "1" value. Note: This value is always "0" when the Camera responds.
Data length	This "Data Length" value tells how many bytes the "Data" will contain. The "Data Length" must be specified in bytes.
Data	This field is for option, set value and/or acquired value. The size must be specified as "Data Length".
Check sum	The "Check sum" functions to verify the integrity of the communication transmission. The "Check sum" value should equal the last (low) 8 bits of the summary of ["Command" + "Direction" + "Data Length" + "Data"]. If this value of "Check sum" does not match with last (low) 8 bits of the summary data of ["Command" + "Direction" the camera will generate th
EOF	End of the Frame. This val

7.3 Camera control commands

All data in this section is described in Hexadecimal format (HEX).

7.3.1 The command list for the communication

Command (HEX)	Details
4A	The format for reading data to the camera IC's is as follows: In the case of writing, since maximum number of addresses can be written at once is 32 addresses, data must be written 8 times separately if 256 bytes data must be written. [SLV]: Slave Address (Please refer to the Slave address for the ICs (8 bits) list) [START_H] x 16 + [START_L]: Star Address (0000 to 03FF) [END_H] x 16 + [END_L]: End Address (0000 to 03FF) [Data (i)]: Data on Address **i** [DataLenH]: Upper Byte of [END_H] x 16 + [END_L] - [START_H] x 16 + [START_L] + 6 [DataLenL]: Lower Byte of [END_H] x 16 + [END_L] - [START_H] x 16 + [START_L] + 6 The format for reading data to the camera IC's is as follows: Send data 02, 4A, 00, 05, [SLV], [START_H], [START_L], [END_H], [END_L], [CHK], 03 [CHK] = Lower 8bits of "4A + 00 + 05 + [SLV] + [START_H] + [START_L] + [END_H] + [END_L]" Receive Data 02, 4A, [DataLenH], [DataLenL], [SLV], [START_H], [START_L], [END_H], [END_L], [DATASTART], [DATASTART + 1], … , [DATAEND], [CHK], 03 [CHK] = Lower 8bits of "4A + [DataLenH] + [DataLenL] + [SLV] + [START_H] + [START_L] + [END_H] + [END_L] + [DATASTART] + [DATASTART + 1] + … + [DATAEND]" *An example of sending a command to (IC slave address is 50) is as follo (02, 4A, 00, 03, 50, 00, 00, 07, FF

Command (HEX)	Details
4A	The format for writing data to the camera IC's is as follows: Send Data 02, 4A, [DataLenH] + 80, [DataLenL], [SLV], [START_H], [START_L], [END_H], [END_L], [DATASTART], [DATASTART + 1], … , [DATAEND], [CHK], 03 [CHK] = Lower 8bits of "4A + ([DataLenH] +80) + [DataLenL] + [SLV] + [START_H] + [START_L] + [END_H] + [END_L] + [DATASTART] + [DATASTART + 1] + … + [DATAEND]" Receive Data 02, 4A, [DataLenH], [DataLenL], [SLV], [START_H], [START_L], [END_H], [END_L], [DATASTART], [DATASTART + 1], … , [DATAEND], [CHK], 03 [CHK] = Lower 8bits of "4A + [DataLenH] + [DataLenL] + [SLV] + [START_H] + [START_L] + [END_H] + [END_L] + [DATASTART] + [DATASTART + 1] + … + [DATAEND]" *An example of the sending data to write 23 to address 10 of the IC (IC slave address is 20) is as follows: (02, 4A, 80, 06, 20, 00, 10, 00, 10, 23, 33, 03)
50	This command is for sending an OSCD (On Screen Character Display) command to the camera. As stated above, when writing OSCD commands to the camera, 32 bytes is the maximum amount of data that can be written to the camera, with one communication. For additional information, please check section "OSCD Command". In order to generate an OSCD, set the "Command" to a value of 50. Set OSCD command to Data, set the number of byte of the OSCD command to Data Length. * The format for sending a command to the camera to clear the display and then to generate a display of [0123] on the 3rd row of the 1st column is as follows: (02, 50, 80, 0A, 08, 92, 18, 38, DC, 10, 11, 12, 13, FF, E5, 03)

7.3.2 Slave address for the ICs (8 bits) list

IC	Slave Address	詳細
DSP	80	DSP data
EEPROM	60	The Virtual EEPROM zone for the currently selected DSP preset mode of Preset0 to Preset7
EEPROM	90	The EEPROM zone for the Preset0 DSP data
EEPROM	91	The EEPROM zone for the Preset1 DSP data
EEPROM	92	The EEPROM zone for the Preset2 DSP data
EEPROM	93	The EEPROM zone for the Preset3 DSP data
EEPROM	94	The EEPROM zone for the Preset4 DSP data
EEPROM	95	The EEPROM zone for the Preset5 DSP data
EEPROM	96	The EEPROM zone for the Preset6 DSP data
EEPROM	97	The EEPROM zone for the Preset7 DSP data
uCOM	20	The uCOM data
EEPROM	40	The EEPROM zone for uCOM Data

Note: There is maximum number of writing to EEPROM of 1,000,000 times.

7.3.3 Error code list

If an error occurs, the camera sends an error code with the following format:
The Command number of the Error Message is FF (HEX). The Data length is 0002.

Error	Receive data
Check sum does NOT match the data being transmitted	02, FF, 00, 02, 03, 00, 04, 03
The command being transmitted does NOT exist or is invalid	02, FF, 00, 02, 04, 00, 05, 03
Unprocessed data remains in the receiving buffer	02, FF, 00, 02, 05, 00, 06, 03
Time out	02, FF, 00, 02, 06, 00, 07, 03
Over run error	02, FF, 00, 02, 08, 00, 09, 03
Framing error	02, FF, 00, 02, 09, 00, 0A, 03
Data length error (too long)	02, FF, 00, 02, 0B, 00, 0C, 03
I2C communication error	02, FF, 00, 02, 10, 00, 11, 03

Note.1: The camera disregards the data, which is not start with SOF.
Note.2: The time out error is occurred when does not receive the next data 3 seconds after receive the data.

OMRON

7.4 The uCOM register mapping list

* Please do not change “Reserved data”.

Address	7	6	5	4	3	2	1	0	Descriptions	Default
000						X	X	X	User Preset DSP register setting can save on eight Preset areas. * When this vale saves to the EEPRM, camera starts with saved DSP mode at power up. 0: Preset 0 1: Preset 1 2: Preset 2 3: Preset 3 4: Preset 4 5: Preset 5 6: Preset 6 7: Preset 7	0
	X	X	X	X	X				Reserved	-
001 - 00D	X	X	X	X	X	X	X	X	Reserved	
00E								X	Control by the "Push button" on the side of the camera 0: Disable 1: Enable	1
	X	X	X	X	X	X	X		Reserved	-
00F							X	X	UART baud rate 0: 9,600 bps 1: 19,200 bps 2: 38,400 bps 3: 9,600 bps * Change to lower baud rate when communication error is occurred.	2
			X	X	X	X			Reserved	-
		X							Return data and data length of UART write command 0: Return data is including exact same data of write command. 1: Return data is excluding data of write command, and data length is 0.	0
	X								UART check sum 0: Disable 1: Enable * When selecting disable, camera process command even check sum of send command is not mach.	1

Address	7	6	5	4	3	2	1	0	Descriptions	Default
010	X	X	X	X	X	X	X	X	User defined color 0 Red	255
011	X	X	X	X	X	X	X	X	User defined color 0 Green	128
012	X	X	X	X	X	X	X	X	User defined color 0 Blue	0
013	X	X	X	X	X	X	X	X	User defined color 1 Red	255
014	X	X	X	X	X	X	X	X	User defined color 1 Green	0
015	X	X	X	X	X	X	X	X	User defined color 1 Blue	128
016	X	X	X	X	X	X	X	X	User defined color 2 Red	128
017	X	X	X	X	X	X	X	X	User defined color 2 Green	255
018	X	X	X	X	X	X	X	X	User defined color 2 Blue	0
019	X	X	X	X	X	X	X	X	User defined color 3 Red	0
01A	X	X	X	X	X	X	X	X	User defined color 3 Green	255
01B	X	X	X	X	X	X	X	X	User defined color 3 Blue	128
01C	X	X	X	X	X	X	X	X	User defined color 4 Red	128
01D	X	X	X	X	X	X	X	X	User defined color 4 Green	0
01E	X	X	X	X	X	X	X	X	User defined color 4 Blue	255
01F	X	X	X	X	X	X	X	X	User defined color 5 Red	0
020	X	X	X	X	X	X	X	X	User defined color 5 Green	128
021	X	X	X	X	X	X	X	X	User defined color 5 Blue	255
022	X	X	X	X	X	X	X	X	User defined color 6 Red	128
023	X	X	X	X	X	X	X	X	User defined color 6 Green	128
024	X	X	X	X	X	X	X	X	User defined color 6 Blue	128
025	X	X	X	X	X	X	X	X	User defined color 7 Red	255
026	X	X	X	X	X	X	X	X	User defined color 7 Green	207
027	X	X	X	X	X	X	X	X	User defined color 7 Blue	0
028					X	X	X	X	Control button (Decrease page) for display menu 9: WB 10: SW A 11: SW B 12: SW C 13: SW D 14: SW E 15: SW F	0
	X	X	X	X					Control button (Increase page) for display menu 9: WB 10: SW A 11: SW B 12: SW C 13: SW D 14: SW E 15: SW F	9
029					X	X	X	X	Menu: down Selectable Pa	15
	X	X	X	X					Menu: up Selectable Pa	
02A					X	X	X	X	Menu: right Selectable Pa	
	X	X	X	X					Menu: left Selectable Pa	
02B					X	X	X	X	Menu: return Selectable Pa	
	X	X	X	X					Menu: enter Selectable Pa	

Address	7	6	5	4	3	2	1	0	Descriptions	Default
02C - 038	X	X	X	X	X	X	X	X	Reserved	-
039	X	X	X	X	X	X	X	X	Default function of primary switch WB: single push * As for the detail of selectable function, please refer to Push button function list	2
03A	X	X	X	X	X	X	X	X	Default function of external switch A: single push * As for the detail of selectable function, please refer to Push button function list	1
03B	X	X	X	X	X	X	X	X	Default function of external switch B: single push * As for the detail of selectable function, please refer to Push button function list	0
03C	X	X	X	X	X	X	X	X	Default function of external switch C: single push * As for the detail of selectable function, please refer to Push button function list	0
03D	X	X	X	X	X	X	X	X	Default function of external switch D: single push * As for the detail of selectable function, please refer to Push button function list	0
03E	X	X	X	X	X	X	X	X	Default function of external switch E: single push * As for the detail of selectable function, please refer to Push button function list	0
03F	X	X	X	X	X	X	X	X	Default function of external switch F: single push * As for the detail of selectable function, please refer to Push button function list	0
040 - 048	X	X	X	X	X	X	X	X	Reserved	-
049	X	X	X	X	X	X	X	X	Default function of primary switch WB: hold * As for the detail of selectable function, please refer to Push button function list	3
04A	X	X	X	X	X	X	X	X	Default function of external switch A: hold * As for the detail of selectable function, please refer to Push button function list	0
04B	X	X	X	X	X	X	X	X	Default function of external switch B: hold * As for the detail of selectable function, please refer to Push button function list	0
04C	X	X	X	X	X	X	X	X	Default function of external switch C: hold * As for the detail of selectable function, please refer to Push button functio	0
04D	X	X	X	X	X	X	X	X	Default functic * As for the c button functio	
04E	X	X	X	X	X	X	X	X	Default functic * As for the c button functio	
04F	X	X	X	X	X	X	X	X	Default functic * As for the c button functio	

Address	7	6	5	4	3	2	1	0	Descriptions	Default
050						X	X	X	OSD menu color 0: Black 1: Blue 2: Green 3: Cyan 4: Red 5: Magenta 6: Yellow 7: White	7
					X				OSD character size 0: Large 1: Small	0
	X	X	X	X					Reserved	-
051	X	X	X	X	X	X	X	X	OSD horizontal display position 0: Left to 256: Right	0
052	X	X	X	X	X	X	X	X	OSD vertical display position 0: Top to 256: Bottom	0
053 - 054	X	X	X	X	X	X	X	X	Reserved	-
055								X	Still Image 0: Off (Movie) 1: On (Still image)	0
						X	X		Test Pattern selection 0: Off (Camera image) 1: Gray Scale 2: Color Bar 3: Color Bar + Gray Scale	0
	X	X	X	X	X				Reserved	-
056		X	X	X	X	X	X	X	Digital Zoom M = 128 / (128 - x) M: Magnification, x: Setting Parameter	0
	X								Reserved	-
057	X	X	X	X	X	X	X	X	Reserved	-
058	X	X	X	X	X	X	X	X	Digital zoom pan (Horizontal Offset) [little-endian]	0
059						X	X	X	Two's complement	
	X	X	X	X	X			X	Reserved	-
05A	X	X	X	X	X	X	X	X	Digital zoom tilt(Vertical Offset) [little-endian]	0
05B						X	X	X	Two's complement	
	X	X	X	X	X			X	Reserved	-
05C	X	X	X	X	X	X	X	X	Horizontal line min position [little-endian] (to Push Button)	0
05D	0	0	0	0	0	X	X	X		
05E	X	X	X	X	X	X	X	X	Horizontal line max position [little-endian] (to Push Button)	1,920
05F	0	0	0	0	0	X	X	X		
060	X	X	X	X	X	X	X	X	Horizontal line	
061	0	0	0	0	0	X	X	X		
062	X	X	X	X	X	X	X	X	Vertical line m	
063	0	0	0	0	0	X	X	X		
064	X	X	X	X	X	X	X	X	Vertical line m	
065	0	0	0	0	0	X	X	X		
066	X	X	X	X	X	X	X	X	Vertical line m	
067	0	0	0	0	0	X	X	X		

Address	7	6	5	4	3	2	1	0	Descriptions	Default
068	X	X	X	X	X	X	X	X	Shadow Horizontal min position [little-endian] (for Push Button)	0
069	0	0	0	0	0	X	X	X		
06A	X	X	X	X	X	X	X	X	Shadow Horizontal max position [little-endian] (for Push Button)	1,920
06B	0	0	0	0	0	X	X	X		
06C	X	X	X	X	X	X	X	X	Shadow Vertical min position [little-endian] (for Push Button)	0
06D	0	0	0	0	0	X	X	X		
06E	X	X	X	X	X	X	X	X	Shadow Vertical max position [little-endian] (for Push Button)	1,080
06F	0	0	0	0	0	X	X	X		
070 - 3FF	X	X	X	X	X	X	X	X	Reserved	-

7.4.1 Push Button Function on Meru

When menu is displayed, the following function is assign for each Push Button.

WB: Increase Page	increase page number
SW A: Return	Close the menu
SW B: Increment	Increment cursor or value cursor or value
SW C: Select Left	Select left selection
SW D: Execute	Execute the selected function
SW E: Select Right	Select right selection
SW F: Decrement	Decrement cursor or value

7.4.2 Push button function list

Value	Function	Function Description
0x00	Disabled	Disable Push button control
0x01	Display Menu	Display Menu on the screen
0x02	Push Lock WB [Save]	Execute Push Lock White Balance. And save the setting as AWB HOLD on the EEPROM
0x03	WB mode(AWB) [Save]	Set White Balance Mode：Auto, and save the setting on EEPROM
0x04	Change H Inversion	Horizontal flip the image
0x05	Change V Inversion	Vertical flip the image
0x06	Change HV Inversion	Horizontal-Vertical flip the image
0x07	Change H Inversion [Save]	Save the setting after H flip the image
0x08	Change V Inversion [Save]	Save the setting after V flip the image
0x09	Change HV Inversion [Save]	Save the setting after H-V flip the image
0x0A	Change display marker	Set the marker display enable or disable
0x0B	Change display line	Set the line display enable or disable
0x0C	Change display shadow	Set the shadow mask display enable or disable
0x0D	Change display marker [Save]	Set the marker display enable or disable, and save the setting on EEPROM
0x0E	Change display line [Save]	Set the line display enable or disable, and save the setting on EEPROM
0x0F	Change display shadow [Save]	Set the shadow mask display enable or disable, and save the setting on EEPROM
0x10	H Line Maker1 position (+)	Horizontal Line Marker1 shift to the bottom.
0x11	H Line Maker1 position (-)	Horizontal Line Marker1 shift to the top.
0x12	V Line Maker1 position (+)	Vertical Line Marker1 shift to the left.
0x13	V Line Maker1 position (-)	Vertical Line Marker1 shift to the right.
0x14	H Line Maker2 position (+)	Horizontal Line Marker2 shift to the bottom.
0x15	H Line Maker2 position (-)	Horizontal Line Marker2 shift to the top.
0x16	V Line Maker2 position (+)	Vertical Line Marker2 shift to the left.
0x17	V Line Maker2 position (-)	Vertical Line Marker2 shift to the right.
0x18	Shadow mask Top (+)	Shadow mask on top shift to the bottom.
0x19	Shadow mask Top (-)	Shadow mask on top shift to the top.
0x1A	Shadow mask Bottom (+)	Shadow mask on bottom shift to the bottom.
0x1B	Shadow mask Bottom (-)	Shadow mask on bottom shift to the top.
0x1C	Shadow mask Left (+)	Shadow mask on left shift to the right.
0x1D	Shadow mask Left (-)	Shadow mask on left shift to the left.
0x1E	Shadow mask Right (+)	Shadow mask on right shift to the right.
0x1F	Shadow mask Right (-)	Shadow
0x20	Change display circle marker	Set the
0x21	Change display circle marker [Save}	Set the EEPRO
0x22	H Circle Maker position (+)	The ce
0x23	H Circle Maker position (-)	The ce
0x24	V Circle Maker position (+)	The ce
0x25	V Circle Maker position (-)	The ce
0x26	Change Still image	Set the

OMRON

7.5 The DSP register mapping list

* Please do not change access “Reserved data”.

Address	7	6	5	4	3	2	1	0	Descriptions	Default
000							X	X	AE mode 0: Normal AE 1: Long AE 2: USER mode	0
	X	X	X	X	X	X			Reserved	-
001	X	X	X	X	X	X	X	X	Normal AE maximum shutter time [little-endian]	400
002	X	X	X	X	X	X	X	X	1 step 0.1 mseconds, 1 (100 useconds) to 400 (40 mseconds)	
003	X	X	X	X	X	X	X	X	Reserved	-
004	X	X	X	X	X	X	X	X	Normal AE maximum gain [little-endian]	140
005	X	X	X	X	X	X	X	X	1 step 0.3 (dB), 4 (1.2 dB) to 150 (45.0 dB)	
006	X	X	X	X	X	X	X	X	Long AE normal shutter time [little-endian]	166
007	X	X	X	X	X	X	X	X	1 step 0.1 mseconds, 1 (100 useconds) to 400 (40 mseconds)	
008	X	X	X	X	X	X	X	X	Long AE expanded shutter time [little-endian]	333
009	X	X	X	X	X	X	X	X	1to 500 (1 step 0.1 mseconds), 501 to 1,000 (1 step 1 mseconds), 1001 to 1,200 (1 step 10 mseconds)	
00A	X	X	X	X	X	X	X	X	Long AE maximum shutter time [little-endian]	600
00B	X	X	X	X	X	X	X	X	1 to 500 (1 step 0.1 mseconds), 501 to 1,000 (1 step 1 mseconds), 1,001 to 1,200(1 step 10 mseconds)	
00C	X	X	X	X	X	X	X	X	Long AE low gain [little-endian]	96
00D	X	X	X	X	X	X	X	X	1 step 0.3 (dB) 4 (1.2 dB) to 150 (45.0 dB)	
00E	X	X	X	X	X	X	X	X	Long AE high gain [little-endian]	120
00F	X	X	X	X	X	X	X	X	1 step 0.3 (dB) 4 (1.2 dB) to 150 (45.0 dB)	
010	X	X	X	X	X	X	X	X	Long AE maximum gain [little-endian]	140
011	X	X	X	X	X	X	X	X	1 step 0.3 (dB) 4 (1.2 dB) to 150 (45.0 dB)	
012	X	X	X	X	X	X	X	X	USER mode shutter time [little-endian]	100
013	0	0	0	0	0	X	X	X	Shutter time on USER mode(Manual) When USER mode is selected on AE mode. This register is available. 1 to 500 (1 step 0.1 mseconds), 501 to 1,000 (1 step 1 mseconds), 1,000 to 1,200 (1 step 10 mseconds)	
014	X	X	X	X	X	X	X	X	USER mode gain [little-endian]	0
015	0	0	0	0	0	X	X	X	Gain on USEF When USER r available. Parameter v	
016 - 019	X	X	X	X	X	X	X	X	Reserved	
01A						X	X	X	Flickerless mc 0: Auto 4: 60 Hz fixed Please do not	
	X	X	X	X	X				Reserved	

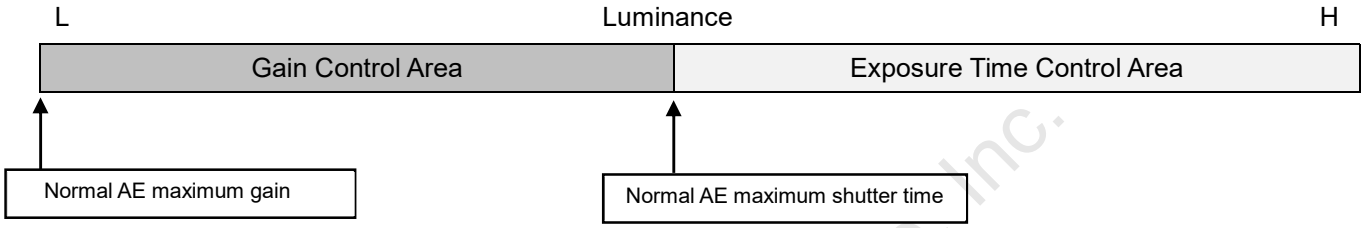
Address	7	6	5	4	3	2	1	0	Descriptions	Default
01B	X	X	X	X	X	X	X	X	AE convergence speed Set the convergence speed Max：10、When larger number set, AE works slower.	32
01C	X	X	X	X	X	X	X	X	Convergence end dead band range	26
01D	X	X	X	X	X	X	X	X	Frame count for outside the dead band	8
01E	X	X	X	X	X	X	X	X	AE tracking start dead band range	4
01F	X	X	X	X	X	X	X	X	Reserved	-

Normal AE

When AE Mode =0[h] was selected, the normal AE mode is established. In this AE mode, the gain and exposure time are automatically adjusted so that the images have the appropriate brightness.

Maximum Exposure time can be set on Normal AE maximum shutter time (0x001-0x002).
Maximum Gain can be set on Normal AE maximum gain (0x004-0x005).

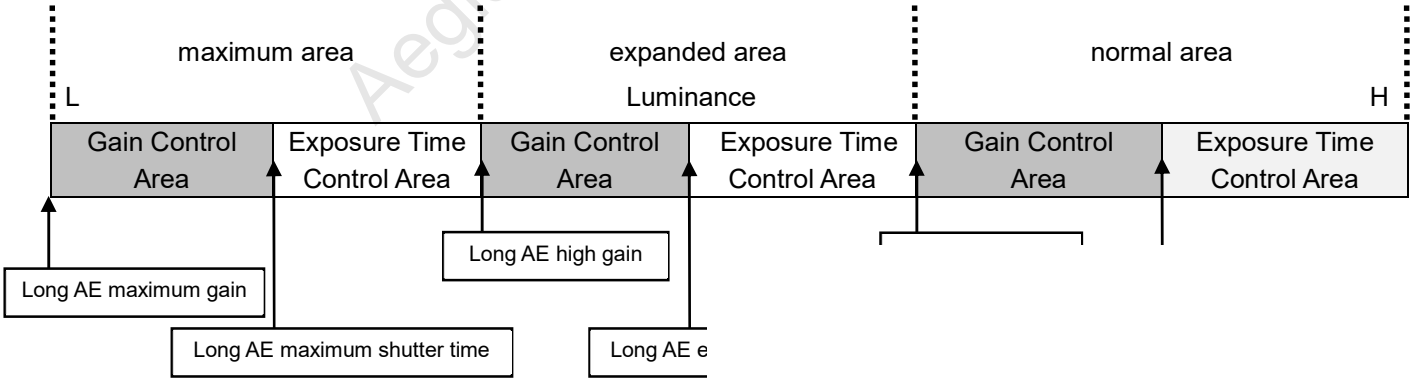
In the normal mode, it is not possible to extend the exposure time beyond the frame rate. This level is referred to as the maximum exposure time. To extend the exposure time beyond the frame rate, please select Long AE.



Long AE

When the AE mode =1[h] is selected, the long AE control mode is established.
Long AE control makes it possible to expand the frame rate and obtain a longer exposure time. Then long AE can keep the best image in low luminance.

Exposure time control on normal area can be set on Long AE normal shutter time (0x006 - 0x007).
Gain control on normal area can be set on Long AE low gain (0x00C - 0x00D).
Exposure time control on expanded area can be set on Long AE expanded shutter time (0x008 - 0x009).
Gain control on expanded area can be set on Long AE high gain (0x00E - 0x00F).
Exposure time control on maximum area can be set on Long AE maximum shutter time (0x00A - 0x00B).
Gain control on maximum area can be set on Long AE maximum gain (0x010 - 0x011).



Please follow the rule as below.
Long AE normal shutter time <= Long AE expande
Long AE low gain <= Long AE high gain <= Long A

USER mode

When AE Mode = 2[h] was selected, the USER mode is established. In this USER mode, the gain and exposure time can be configured. If exposure time is longer than Normal AE maximum shutter time, Long AE mode will be available. Exposure time can be set on USER mode shutter time (0x012 - 0x013).
Gain can be set on USER mode gain (0x014 - 0x015).

Flicker less mode

Horizontal band noise that is called “rolling bars” or “Flicker” and shown in the figure below is generated when shooting under fluorescent lights whose flickering periods differ from the shutter periods. The function is capable of reducing the rolling bars by adjusting the shutter speed so as to match the light-emitting frequency of the fluorescent lights.

Auto Flicker less

If 50Hz flicker is detected, it will shift to 50Hz flicker-less. If 60Hz flicker will be detected, it will shift to 60Hz flicker-less. When judging with outdoor during flicker-less compensation, flicker-less compensation shifts to OFF state.

50/60Hz fixed Flicker less mode

The table below shows the exposure times when the frame rate is 25, 30, 50, 60 and when the 50 Hz mode and 60 Hz mode are established by selecting this mode, respectively, as the flicker less mode setting.
The exposure time changes in steps. The minimum shutter time is approximately 1/100s and 1/120s in the 50 Hz mode and 60 Hz mode, respectively. This minimum shutter time is called the flicker less minimum fixed shutter time and the maximum is called flicker-less maximum shutter time.

Frame Rate 25fps				Frame Rate 30fps			
50Hz Fixed mode		60Hz Fixed mode		50Hz Fixed mode		60Hz Fixed mode	
39.8 mseconds	1/25 seconds	33.4 mseconds	1/29 seconds	-	-	33.2 mseconds	1/30 seconds
20.1 mseconds	1/49 seconds	16.6 mseconds	1/60 seconds	20.1 mseconds	1/49 seconds	16.6 mseconds	1/60 seconds
10 mseconds	1/100 seconds	8.3 mseconds	1/120 seconds	10 mseconds	1/100 seconds	8.3 mseconds	1/120 seconds

Frame Rate 50fps				Frame Rate 60fps			
50Hz Fixed mode		60Hz Fixed mode		50Hz Fixed mode		60Hz Fixed mode	
20.1 mseconds	1/49 seconds	16.6 mseconds	1/60 seconds	-	-	16.6 mseconds	1/60 seconds
10 mseconds	1/100 seconds	8.3 mseconds	1/120 seconds	10 mseconds	1/100 seconds	8.3 mseconds	1/120 seconds

AE convergence speed

The AE convergence speed register is used to set th
image to be established. The fastest setting is A[h]
reduced. Conversely, if it is too low, hunting may occu

Convergence end dead band range

The Convergence end identification dead band range
identified, and convergence end is identified when the
same status has continued for 3 frames. The dead ba

Frame count for outside the dead band

This function is used to ensure that the AE operation will not overly respond to changes in the subject when an object has passed cut across the shooting screen while AE is in the appropriate status. Tracking is started when the AE error amount is above the setting and this has continued for at least the number of Frame count for outside the dead band frames.

The dead band range is the setting × 16 × 6.02/1024 [dB].

Address	7	6	5	4	3	2	1	0	Descriptions	Default
020	X	X	X	X	X	X	X	X	Convergence luminance [little-endian]	4,608
021	X	X	X	X	X	X	X	X	This setting is target luminance at which AE has converged to the appropriate luminance.	
022 - 027	X	X	X	X	X	X	X	X	Reserved	-
028	X	X	X	X	X	X	X	X	Gain Priority Mode 0: Disable 5: 1.20 dB 6: 3.31 dB 7: 5.12 dB 8: 6.92 dB 9: 9.33 dB 10: 11.14 dB 11: 12.94 dB 12: 15.34 dB 13: 17.16 dB 14: 18.96 dB 15: 21.37 dB 16: 23.18 dB 17: 24.00 dB 18: 27.09 dB 19: 29.20 dB Please do not select other value.	0
029	X	X	X	X	X	X	X	X	Shutter Priority Mode [little-endian]	0
02A	X	X	X	X	X	X	X	X	0: Disable 1 to 500 (1 Step 0.1 mseconds), 501 to 1,000 (1 Step 1 mseconds), 1,001 to 1,200 (1 Step 10 mseconds)	
02B - 02F	X	X	X	X	X	X	X	X	Reserved	-

Gain Priority Mode

Gain Priority(0x28) involves adjusting the shutter time automatically so that image is set to the optimum brightness after the gain level is fixed. Set the AE mode register to normal AE =0[h] or long AE =1[h]. When the value except = 0[h] is set on the Gain Priority(0x28) register, the mode is gain priority. When it is 0[h], the mode is removed.

Shutter Priority Mode

Shutter Priority (0x29-0x2A) functions to automatica
appropriate images. Set the AE mode register to norr
is set to off, and the normal AE mode is established.

Address	7	6	5	4	3	2	1	0	Descriptions	Default
030							X	X	White Balance Mode 0: Auto 1: Full Open 2: AWB Hold 3: USER Mode	0
		X	X	X	X	X			Reserved	-
	X								Push Lock (After the Push Lock, White Balance mode turn to the AWB mode automatically) 0:OFF 1:ON (Automatically turn 0, after convergence)	0
031	X	X	X	X	X	X	X	X	AWB Pull-in Delay Unit: Frame number When a status outside the dead band has been detected in the ATW mode, pull-in is started after achieving consistency in the number of frames specified by the this parameter.	8
032	X	X	X	X	X	X	X	X	AWB Pull-in Speed Unit: Frame number Pull-in speed of ATW mode is set in the number of frames specified by this parameter. This register is available in Auto, or Full Open on White Balance Mode	1
033	X	X	X	X	X	X	X	X	Convergence Step inside target area The ATW pull-in steps inside target area can be indicated. When set step shortly, the convergence speed of white balance is faster.	12
034	X	X	X	X	X	X	X	X	Convergence Step outside target area The ATW pull-in steps outside target area can be indicated. When set step shortly, the convergence speed of white balance is faster.	12
035	X	X	X	X	X	X	X	X	Pull-in Step for Full Open When set the number of steps for full open mode pull-in, the convergence speed is faster.	2
036	X	X	X	X	X	X	X	X	User Mode fixed coordinate R/G	2,453
037	X	X	X	X	X	X	X	X	This register is available on USER mode	
038	X	X	X	X	X	X	X	X	User Mode fixed coordinate B/G	7,295
039	X	X	X	X	X	X	X	X	This register is available on USER mode	
03A - 03F	X	X	X	X	X	X	X	X	Reserved	-
040	0	0	0	0	X	X	X	X	Resolution/FrameRate 0: 1080P 60 fps 1: 1080P 30 fps 2: 1080P 50 fp 6: 720P 60 fps 10: 1080P 59. 13: 720P 59.9 Please do not	0
041							X	X	Image Output 0: Standard 2: V Inversion	
	X	X	X	X	X	X			Reserved	
042	X	X	X	X	X	X	X	X	Reserved	

White Balance

- Auto (Auto Trace White balance)
  AWB Pull-in Speed, AWB Pull-in Delay, Convergence Step can be configurable. This function sets the pull-in frame and target frame and automatically tracks the changes in the color temperature to adjust the white balance.

- Full-Open
  This function adjusts the white balance regardless of the subject conditions. The control is exercised at all times without depending on the pull-in frame.

- AWB Hold
  When the hold mode is established, the white balance (WB) gain value established at that time is held, and the AWB operation is stopped.

- Push Lock Function
  When the White Balance Mode is set to “2” (Full Open),and White Balance Mode is set to "AWB Hold". The white balance gain values are kept and white balance is stopped. This function that saves the data in the EEPROM is called the Push Lock Function.

  When AWB hold mode is established, the white balance gain values at this time are saved in the registers, and the white balance gain is held. When push the “Push Lock” button on the control software, the mode turn from Full-Open to AWB Hold. Save the White Balance mode = AWB Hold on EEPROM

- USER mode
  In the normal user mode, the white balance can be adjusted exactly as desired. To set the white balance through User Mode fixed coordinate R/G (0x036 - 0x37) and User Mode fixed coordinate B/G 0x38-0x39)

Address	7	6	5	4	3	2	1	0	Descriptions	Default
043						X	X	X	Gamma Mode 0: Manual 1: 0.45 2: 0.6 3: 0.8 4: 1.0	0
				X	X				Gamma Output Selection 0: Converted Output 1: Unconverted Output	0
	X	X	X						Reserved	-
044	X	X	X	X	X	X	X	X	Manual Gamma 00 [little-endian]	408
045	0	0	0	0	X	X	X	X		
046	X	X	X	X	X	X	X	X	Manual Gamma 01 [little-endian]	432
047	0	0	0	0	X	X	X	X		
048	X	X	X	X	X	X	X	X	Manual Gamma 02 [little-endian]	464
049	0	0	0	0	X	X	X	X		
04A	X	X	X	X	X	X	X	X	Manual Gamma 03 [little-endian]	496
04B	0	0	0	0	X	X	X	X		
04C	X	X	X	X	X	X	X	X	Manual Gamma 04 [little-endian]	544
04D	0	0	0	0	X	X	X	X		
04E	X	X	X	X	X	X	X	X	Manual Gamma 05 [little-endian]	592
04F	0	0	0	0	X	X	X	X		
050	X	X	X	X	X	X	X	X	Manual Gamma 06 [little-endian]	640
051	0	0	0	0	X	X	X	X		
052	X	X	X	X	X	X	X	X	Manual Gamma 07 [little-endian]	688
053	0	0	0	0	X	X	X	X		
054	X	X	X	X	X	X	X	X	Manual Gamma 08 [little-endian]	736
055	0	0	0	0	X	X	X	X		
056	X	X	X	X	X	X	X	X	Manual Gamma 09 [little-endian]	768
057	0	0	0	0	X	X	X	X		
058	X	X	X	X	X	X	X	X	Manual Gamma 10 [little-endian]	0
059	0	0	0	0	X	X	X	X		
05A	X	X	X	X	X	X	X	X	Manual Gamma 11 [little-endian]	636
05B	0	0	0	0	X	X	X	X		
05C	X	X	X	X	X	X	X	X	Manual Gamma 12 [little-endian]	869
05D	0	0	0	0	X	X	X	X		
05E	X	X	X	X	X	X	X	X	Manual Gamma 13 [little-endian]	992
05F	0	0	0	0	X	X	X	X		
060	X	X	X	X	X	X	X	X	Manual Gamn	
061	0	0	0	0	X	X	X	X		
062	X	X	X	X	X	X	X	X	Manual Gamn	
063	0	0	0	0	X	X	X	X		
064	X	X	X	X	X	X	X	X	Manual Gamn	
065	0	0	0	0	X	X	X	X		
066	X	X	X	X	X	X	X	X	Manual Gamn	
067	0	0	0	0	X	X	X	X		
068	X	X	X	X	X	X	X	X	Manual Gamn	
069	0	0	0	0	X	X	X	X		
06A	X	X	X	X	X	X	X	X	Manual Gamn	
06B	0	0	0	0	X	X	X	X		

Address	7	6	5	4	3	2	1	0	Descriptions	Default
06C	X	X	X	X	X	X	X	X	Manual Gamma 20 [little-endian]	1,348
06D	0	0	0	0	X	X	X	X		
06E	X	X	X	X	X	X	X	X	Manual Gamma 21 [little-endian]	1,360
06F	0	0	0	0	X	X	X	X		
070	X	X	X	X	X	X	X	X	Manual Gamma 22 [little-endian]	1,372
071	0	0	0	0	X	X	X	X		
072	X	X	X	X	X	X	X	X	Manual Gamma 23 [little-endian]	1,388
073	0	0	0	0	X	X	X	X		
074	X	X	X	X	X	X	X	X	Manual Gamma 24 [little-endian]	1,404
075	0	0	0	0	X	X	X	X		
076	X	X	X	X	X	X	X	X	Manual Gamma 25 [little-endian]	1,420
077	0	0	0	0	X	X	X	X		
078	X	X	X	X	X	X	X	X	Manual Gamma 26 [little-endian]	1,436
079	0	0	0	0	X	X	X	X		
07A	X	X	X	X	X	X	X	X	Manual Gamma 27 [little-endian]	1,452
07B	0	0	0	0	X	X	X	X		
07C	X	X	X	X	X	X	X	X	Hue Adjustment (Two's complement)	0
07D	X	X	X	X	X	X	X	X	Saturation Adjustment	128
07E	X	X	X	X	X	X	X	X	Sharpness Gain	64
07F								X	ATR-EX (HDR) 0: Off 1: On	0
	X	X	X	X	X	X	X		Reserved	-
080								X	Photometry Mode 0: Average Photometry 1: Weight Photometry	0
	X	X	X	X	X	X	X		Reserved	-
081	X	X	X	X	X	X	X	X	0 frame coefficient (on Weight Photometry)	9
082	X	X	X	X	X	X	X	X	1 frame coefficient (on Weight Photometry)	15
083	X	X	X	X	X	X	X	X	2 frame coefficient (on Weight Photometry)	9
084	X	X	X	X	X	X	X	X	3 frame coefficient (on Weight Photometry)	18
085	X	X	X	X	X	X	X	X	4 frame coefficient (on Weight Photometry)	72
086	X	X	X	X	X	X	X	X	5 frame coefficient (on Weight Photometry)	18
087	X	X	X	X	X	X	X	X	6 frame coefficient (on Weight Photometry)	12
088	X	X	X	X	X	X	X	X	7 frame coefficient (on Weight Photometry)	30
089	X	X	X	X	X	X	X	X	8 frame coefficient (on Weight Photometry)	12
08A - 0FF	X	X	X	X	X	X	X	X	Reserved	-

Gamma Mode

When use preset value, 1 : 0.45, 2 : 0.6, 3 : 0.8, 4 :
Manual should be selected and set the Gamma KNO

Photometry Mode

In order to achieve the optimum luminance, the phot
value and exposure time to achieve the optimum lur
region using 9 frames (3 horizontal x 3 vertical frame
Average Photometry・・・ This evaluation mode us
Weight Photometry・・・・The weighting for each o

Address	7	6	5	4	3	2	1	0	Descriptions	Default
100								X	Line Marker 0: Disable 1: Enabler	1
							X		Shadow Mask 0: Disable 1: Enable	1
						X			Circle Mask 0: Disable 1: Enable	1
		X	X	X	X				Reserved	-
	X								Marker 0: Disable 1: Enable	1
101	0	0	0	0	X	X	X	X	Shadow mask shading level 0: Invisible to 255: Black	0
102	X	X	X	X	X	X	X	X	Horizontal shadow mask top position [little-endian]	0
103	0	0	0	0	X	X	X	X	0: Top to 1,080: Bottom	
104	X	X	X	X	X	X	X	X	Horizontal shadow mask bottom position [little-endian]	1,080
105	0	0	0	0	X	X	X	X	0: Top to 1,080: Bottom	
106	X	X	X	X	X	X	X	X	Vertical shadow mask left position [little-endian]	0
107	0	0	0	0	X	X	X	X	0: Left to 1,920: Right	
108	X	X	X	X	X	X	X	X	Vertical shadow mask right position [little-endian]	1,920
109	0	0	0	0	X	X	X	X	0: Left to 1,920: Right	
10A					X	X	X	X	Horizontal line1 marker color *as for the configurable color, please refer to the color code chart	0
	X	X	X	X					Vertical line1 marker color *as for the configurable color, please refer to the color code chart	0
10B	X	X	X	X	X	X	X	X	Horizontal line1 marker position [little-endian]	0
10C	0	0	0	0	0	0	0	X	0: Top to 1,080: Bottom	
10D	X	X	X	X	X	X	X	X	Horizontal line1 marker thickness [little-endian]	0
10E	0	0	0	0	0	0	0	X	0: Invisible to 1,080: Maximum	
10F	X	X	X	X	X	X	X	X	Vertical line1 marker position [little-endian]	0
110	0	0	0	0	0	0	0	X	0: Left to 1,920: Right	
111	X	X	X	X	X	X	X	X	Vertical line1 marker thickness [little-endian]	0
112	0	0	0	0	0	0	0	X	0: Invisible to 1,920: Maximum	
113					X	X	X	X	Horizontal line2 marker color *as for the configurable color, please refer to the color code chart	0
	X	X	X	X					Vertical line2 marker color *as for the configurable color, please refer to the color code chart	9
114	X	X	X	X	X	X	X	X	Horizontal line	
115	0	0	0	0	0	0	0	X	0: Top to 1,08	
116	X	X	X	X	X	X	X	X	Horizontal line	
117	0	0	0	0	0	0	0	X	0: Invisible to	
118	X	X	X	X	X	X	X	X	Vertical line2 r	
119	0	0	0	0	0	0	0	X	0: Left to 1,92	
11A	X	X	X	X	X	X	X	X	Vertical line2 r	
11B	0	0	0	0	0	0	0	X	0: Invisible to	

Address	7	6	5	4	3	2	1	0	Descriptions	Default
11C	0	0	0	0	X	X	X	X	Circle marker color *as for the configurable color, please refer to the color code chart	0
11D	X	X	X	X	X	X	X	X	Circle marker radius	0
11E	0	0	0	0	X	X	X	X		
11F	X	X	X	X	X	X	X	X	Circle marker thickness	0
120	0	0	0	0	X	X	X	X		
121	X	X	X	X	X	X	X	X	Circle marker center position (horizontal)	0
122	0	0	0	0	X	X	X	X		
123	X	X	X	X	X	X	X	X	Circle marker center position (vertical)	0
124	0	0	0	0	X	X	X	X		
125								X	Picture mode selection 0: Normal 1: Pseudo	0
							X		Normal color mode shadow mask line color 0: Black 1: Overlay graphics pseudo color	0
	X	X	X	X	X	X			Reserved	-
126					X	X	X	X	Background pseudo color *as for the configurable color, please refer to the color code chart	1
	X	X	X	X					Overlay graphics pseudo color *as for the configurable color, please refer to the color code chart	0
127	X	X	X	X	X	X	X	X	Pseudo color threshold Set the threshold to bipolarize the input video image.	48
128	0	0	0	0	0	0	0	X	Pseudo color slope Set the slope ((Value + 8)/8) of bipolarization. When O is set (slope = 0), Pseudo color would not work. Contrast image still remain. When increase the value, middle slope area would decrease, if 255 is set, polarized image is outputted. Flicker image around border area could occur when larger value is set.	16
129	X	X	X	X	X	X	X	X	Contrast Set the output gain. Output = Parameter value / 128	128
12A		X	X	X	X	X	X	X	RGB offset	0
	X								Color / Monochrome 0: Color 1: Monochrome	0
12B					X	X	X	X	Aperture H. gain in back process	4
	X	X	X	X					Aperture V. gain in back process	6
12C	0	0	0	0	0	0	0	X	Aperture corin	
12D - 1FF	X	X	X	X	X	X	X	X	Reserved	

Color Code Table

16 defined colors can be selected from following table and these colors can be refer to Line Marker and Pseudo Color. As for User Defined Color 0 to 7, user can configure these colors setting through serial communication.

Code	Color
0	Black
1	White
2	Red
3	Green
4	Blue
5	Cyan
6	Magenta
7	Yellow
8	User Defined Color 0
9	User Defined Color 1
10	User Defined Color 2
11	User Defined Color 3
12	User Defined Color 4
13	User Defined Color 5
14	User Defined Color 6
15	User Defined Color 7

7.6 OSCD (On Screen Character Display) Command

7.6.1 2 Byte Command

Note: The data have to send as follow order D15-D8, D7-D0.

Function	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4
Video RAM Batch Clear Command	0	0	0	0	0	0	0	0	0	0	0	0
Display Control Command	0	0	0	0	1	0	0	0	DO	0	FC	FA
Character Size Control Command	0	0	0	1	0	1	V4	V3	V2	V1	V0	H4
Write Address Control Command	0	0	0	1	1	1	0	AD8	AD7	AD6	AD5	AD4
Character Size Control Command	0	0	1	0	0	0	SV1	SV0	SH1	SH0	0	0

Function	D3	D2	D1	D0
Video RAM Batch Clear Command	0	0	0	0
Display Control Command	0	0	BL1	BL0
Character Size Control Command	H3	H2	H1	H0
Write Address Control Command	AD3	AD2	AD1	AD0
Character Size Control Command	AR3	AR2	AR1	AR0

Video RAM Batch Clear Command

Clear the all character data (12Lines 28digits) on Video RAM. meanwhile, Display ON, Framing ON, Blinking, Frame Color and character size might set as default (00H) on all lines.

Display Control Command

DO：Display (0:Display ON, 1:Display OFF)
FC：Frame color (0:Black, 1:White)
FA：Framing (0:ON, 1:OFF)
BL1、BL0：Set the Blinking Frequency
(00: Blinking OFF, 01: Blinking Frequency approxim
03: Blinking Frequency approximately 0.5 Hz)

Character Size Control Command

Set the start position. 32 steps / 8 dots unit on horiz
H4, H3, H2, H1, H0: 8 dots unit (0 to 31)
V4, V3, V2, V1, V0: 4 lines unit (0 to 31)

Write Address Control Command

AD8, AD7, AD6, AD5, AD4, AD3, AD2, AD1, AD0: A
Set the address to write the character. the addres
RAW11 (Column 308 to 335).

Character Size Control Command

Set the character size for each RAW.

SV1, SV0: Size on Vertical (00: x1, 01: x2, 02: x3, 03: x4)

SH1, SH0: Size on Horizontal (00: x1, 01: x2, 02: x3, 03: x4)

AR3, AR2, AR1, AR0: RAW (0 to 11)

OMRON

7.6.2 2 Byte consecutive Command

Note: The data have to send as follow order D15-D8, D7-D0.

Functions	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4
Display Character Control Command	1	1	RV	R	G	B	BL	0	C7	C6	C5	C4

Functions	D3	D2	D1	D0
Display Character Control Command	C3	C2	C1	C0

Display Character Control Command

Set the Writing character data, character color, blink data into Video RAM address.

This command is 2 Byte consecutive command, if more than 2 consecutive character writing are required, just send only lower 8bits (C7 to C0). Write address will be increased automatically.

When character control exits, please send 0xFF (End code of 2 Byte consecutive command).

RV: Character color reverse specification (0: OFF, 1: ON)

RGB: Character Color (0: Black, 1: Blue, 2: Green, 3: Cyan, 4: Red, 5: Magenta, 6: Yellow, 7: White)

BL: Character blinks (0: Blink, 1: Not Blink)

C7-C0: Character code (please refer to the Character table as below)

C7 - C0	Character	C7 - C0	Character	C7 - C0	Character	C7 - C0	Character
000	sp	019	9	032	R	04B	k
001	!	01A	:	033	S	04C	l
002	“	01B	;	034	T	04D	m
003	#	01C	<	035	U	04E	n
004	$	01D	=	036	V	04F	o
005	%	01E	>	037	W	050	p
006	&	01F	?	038	X	051	q
007	‘	020	> fill	039	Y	052	r
008	(	021	A	03A	Z	053	s
009	)	022	B	03B	[	054	t
00A	*	023	C	03C	¥	055	u
00B	+	024	D	03D	]	056	v
00C	,	025	E	03E	< fill	057	w
00D	-	026	F	03F	^	058	x
00E	.	027	G				
00F	/	028	H				
010	0	029	I				
011	1	02A	J				
012	2	02B	K				
013	3	02C	L				
014	4	02D	M				
015	5	02E	N				
016	6	02F	O				
017	7	030	P				
018	8	031	Q				

8 Camera instruction guide

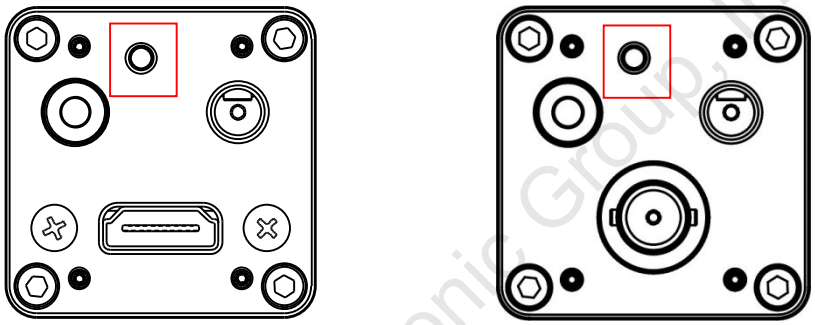
This camera can be set through three setting settings as follows.

A. Push Button
B. External Switch (Remote controller: RC-HD133) *option
C. Through the control software *as for the detail, please refer to the another chapter

8.1 Push Button

White Balance can be set through push button. (*1)

Single Push: Push to set White Balance
Hold: Auto White Balance



Layout of Push button for each model

Related information: another chapter Camera Setting through External Switch (Remote Controller) (AWB HOLD)
(*1) This push button can be assigned another function through communication

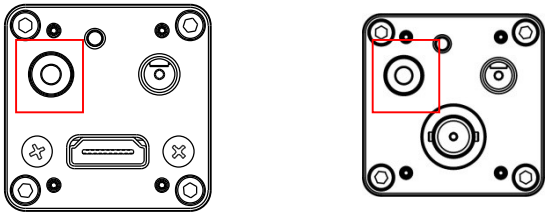
8.2 Camera Setting through External Switch (Remote Controller)

Remote controller (Model:RC-HD133) is option, remote controller is not included camera

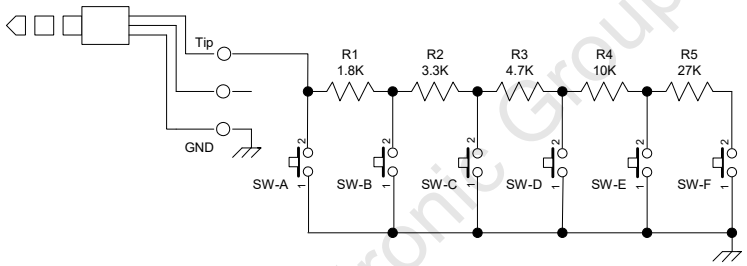
8.2.1 Camera Setting through Switch that has 3.5φ Stereo Pin Jack

A. Please assign each function through control software in advance

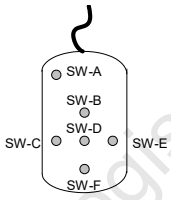
B. Connector



C. Switch Circuit Diagram,



D. Example



E. Switch Function

The button from SW-A to SW-F can be assigned as follow functions.

SW-A: Show OSD Menu
SW-B: Up Cursor (Menu and Select Settir
SW-C: Left Cursor (Select Setting)
SW-D: Execute
SW-E: Right Cursor (Select Setting)
SW-F: Down Cursor (Menu and Select Se

8.2.2 Menu on screen with External Switch

Page 1

```
PAGE 1 2 3 4 5 6
 AE MODE              NORMAL
 LUMINANCE            00000
 PRI GAIN             27.09 dB
 PRI SHUTTER          0000   1/1000s
 USER GAIN            000    46.2dB
 USER SHUTTER         0000   1/1000s
 GAMMA                0.45
```

1) AE MODE

Selects the exposure and the gain operation mode from below three modes. (Default: NORMAL).

a) NORMAL

The auto exposure and the auto gain operation.

The auto exposure operation mode when “OFF” is selecting at “PRI SHUTTER”
The longest exposure time is “1 / frame rate” time for the auto exposure operation.
If “PRI SHUTTER” selects other than “OFF”, the camera operates with the selected exposure time.

The auto gain operation mode when “OFF” is selecting at “PRI GAIN”.
If “PRI GAIN” selects other than “OFF”, the camera operates with the selected gain.

Sets the target brightness level at “LUMINANCE” when “PRI SHUTTER” or “PRI GAIN” is OFF.

b) LONG

The auto exposure and the auto gain operation with the long exposure control.

The auto exposure operation mode when “OFF” is selecting at “PRI SHUTTER”.
The exposure time becomes more than “1 / frame rate” time, which is the long exposure control depending on the target brightness. The frame rate becomes slower when the camera operates with the long exposure control.

The auto gain operation mode when “(
If “PRI GAIN” selects other than “OFF”

Sets the target brightness level at “LUI

c) USER MODE

The manual exposure and the manual
Sets the manual exposure time at “US

2) LUMINANCE

Sets the target Brightness for the “normal” and “long” auto exposure and the auto gain operation.
The brightness image maintains with the auto exposure and the auto gain operation.
Setting range: 0 (Dark) to 65,535 (Bright)
Default: 4,608

3) PRI GAIN

Sets the fixed gain for the “normal” and the “long” auto exposure and the auto gain operation.
Please sets “OFF” for the auto gain operation.
Setting selection: OFF / 1.2 dB / 3.31 dB / 5.12 dB / 6.92 dB / 9.33 dB / 11.14 dB / 12.94 dB / 15.34 dB / 17.16 dB / 18.96 dB / 21.37 dB / 24.0 dB / 27.09 dB / 29.2 dB
Default: OFF

4) PRI SHUTTER

Sets the exposure time for the “normal” and the “long” auto exposure and the auto gain operation.
Please sets “OFF” for the auto shutter operation.
Setting selection: OFF / 1/10,000 seconds (0.0001 seconds) to 2.55 seconds
Default: OFF

5) USER GAIN

Sets the fixed gain for the “USER MODE” exposure and gain operation.
Setting range: 1.2 dB to 46.2 dB
Default: 1.2 dB

6) USER SHUTTER

Sets the exposure time for the “USER MODE” exposure and gain operation.
Setting range: 1/10,000 seconds (0.0001 seconds) to 2.55 seconds
Default: 1/100 seconds (0.01 seconds)

7) GAMMA

Sets the Gamma.
It is necessary to set the manual gamma setting with the PC communication.
Setting selection: MANUAL, 0.45, 0.60, 0.80, 1.00
Default: MANUAL.

Page 2

```
PAGE 1 2 3 4 5 6
 WB MODE              AWB
 USER   R/G           00000
 USER   B/G           00000
 OFFSET               000
 CONTRAST             128
 SHARPNESS            H04   V06   COR03
```

1) WB MODE
Selects the white balance mode from below four modes. (Default: AWB).

a) AWB
The auto white balance.

b) FULL OPEN
The full pull-in frame. As for the detail, please refer to the another chapter.

b) AWB HOLD
Hold the current white balance settings.

b) USER MODE
The manual white balance with “USER R/G” R gain and “USER B/G” B gain.

2) USER R/G
Sets the R/G gain for “USER MODE” white balance.
Setting range: 0 to 65,535
Default: 2,453

3) USER B/G
Sets the B/G gain for “USER MODE” white balance.
Setting range: 0 to 65,535
Default: 7,295

4) OFFSET
Sets the offset of the image.
Setting range: 0 to 127
Default: 0

5) CONTRAST
Sets the contrast of the image.
Setting range: 0 to 128
Default: 128

5) SHARPNESS

Sets the Sharpness (Edge Enhancement) of the image (Default: 0).

a) H

Sets the horizontal sharpness.
Setting range: 0 (Soft) to 15 (Strong)
Default: 0

b) V

Sets the vertical sharpness.
Setting range: 0 (Soft) to 15 (Strong)
Default: 0

b) COR

The noise level also emphasizes when using the sharpness function.
The SN ratio deteriorate for the other than the edge parts is prevented by cutting the signal level that smaller than this setting.
The image becomes the soft image if this setting sets too large.
Setting range: 0 to 63
Default: 3

Page 3

PAGE 1 2 **3** 4 5 6			
GRAPHICS		ON	
LINE		ON	
LINE1	H	POS 0000	SIZE 0000
		COLOR BLACK	
	V	POS 0000	SIZE 0000
		COLOR BLACK	
LINE2	H	POS 0000	SIZE 0000
		COLOR BLACK	
	V	POS 0000	SIZE 0000
		COLOR BLACK	

1) GRAPHICS

Selects enable or disable for the line makers and the shadow mask display. (Default: ON).

a) ON

The line markers and the shadow mask can be display.
The line makers display enable or disable is selecting at “LINE”
The shadow mask display enables or disable is selecting at “SHADOW”.
Sets the color, the size (thickness) and the position for the line makers.
Sets the grade, the position for the shadow mask.

b) OFF

The line markers and the shadow mask do NOT display.

2) LINE

Selects enable or disable for the Line markers display (Default: ON).
This setting is only valid when “GRAPHICS” is “ON”.

a) ON

The line makers can be display.
Sets the color and the size (thickness) and the position for the horizontal line 1, the horizontal line 2, the vertical line1 and/or the vertical line 2.

b) OFF

Line Markers do NOT display.

3) Horizontal line 1 maker and vertical line 1 r

Sets the color, the size (thickness) and the

a) H POS

Sets the position for the horizontal line
Setting range: 0 (Top) to 1,080 (Botton
Default: 0

b) H SIZE
Sets the size (thickness) for the horizontal line 1.
Setting range: 0 (0 line, no horizontal line) to 1,080 (1,080 lines)
Default: 0

c) H COLOR
Sets the color for the horizontal line 1.
It is necessary to set the USER0 to USER7 colors with the PC communication.
Setting selection: BLACK / WHITE / RED / GREEN / BLUE / CYAN / MAGENTA / YELLOW / USER0 / USER1 / USER2 / USER3 / USER4 / USER5 / USER6 / USER7
Default: BLACK

d) V POS
Sets the position for the vertical line 1.
Setting range: 0 (Left end) to 1,920 (Right end)
Default: 0

e) V SIZE
Sets the size (thickness) for the vertical line 1.
Setting range: 0 (0 pixel, no vertical line) to 1,920 (1,920 pixels)
Default: 0

F) V COLOR
Sets the color for the vertical line 1.
It is necessary to set the USER0 to USER7 colors with the PC communication.
Setting selection: BLACK / WHITE / RED / GREEN / BLUE / CYAN / MAGENTA / YELLOW / USER0 / USER1 / USER2 / USER3 / USER4 / USER5 / USER6 / USER7
Default: BLACK

4) Horizontal line 2 maker and vertical line 2 maker settings
Sets the color, the size (thickness) and the position for the horizontal line 2 and the vertical line 2.

a) H POS
Sets the position for the horizontal line 2.
Setting range: 0 (Top) to 1,080 (Bottom)
Default: 0

b) H SIZE
Sets the size (thickness) for the horizo
Setting range: 0 (0 line, no horizontal li
Default: 0

c) H COLOR
Sets the color for the horizontal line 2.
It is necessary to set the USER0 to US
Setting selection: BLACK / WHITE / RI
USER0 / USER1 / US
Default: BLACK

d) V POS

Sets the position for the vertical line 2.
Setting range: 0 (Left end) to 1,920 (Right end)
Default: 0

e) V SIZE

Sets the size (thickness) for the vertical line 2.
Setting range: 0 (0 pixel, no vertical line) to 1,920 (1,920 pixels)
Default: 0

F) V COLOR

Sets the color for the vertical line 2.
It is necessary to set the USER0 to USER7 colors with the PC communication.
Setting selection: BLACK / WHITE / RED / GREEN / BLUE / CYAN / MAGENTA / YELLOW /
USER0 / USER1 / USER2 / USER3 / USER4 / USER5 / USER6 / USER7
Default: BLACK

Page 4

```
PAGE 1 2 3 4 5 6
 GRAPHICS              ON
  SHADOW               ON      GRADE   000
                 H     T  0000         B  1020
                 V     L  0000         R  1280
  CIRCLE               ON
                 RADIUS 000    SIZE 000
                 H     POS 0960
                 V     POS 0540
                       COLOR BLACK
```

1) GRAPHICS

Selects enable or disable for the line makers and the shadow mask. (Default: ON).
This function in the page3 and in the page4 is the same function.

2) SHADOW

Selects enable or disable for the Shadow mask display (Default: ON).
This setting is only valid when “GRAPHICS” is “ON”.

a) ON

The shadow mask can be display.
Sets the grade and the position for the shadow mask.

b) OFF

The shadow mask does NOT display.

3) Shadow mask settings

a) GRADE

Sets the grade of the shadow mask.
Setting range: 0 (No grade, the image is visible) to 255 (Back)
Default: 0

b) SHADOW H T

Sets the position for the top area of the shadow mask
Setting range: 0 (Top) to 1,079 (Botton
Default: 0

c) SHADOW H B

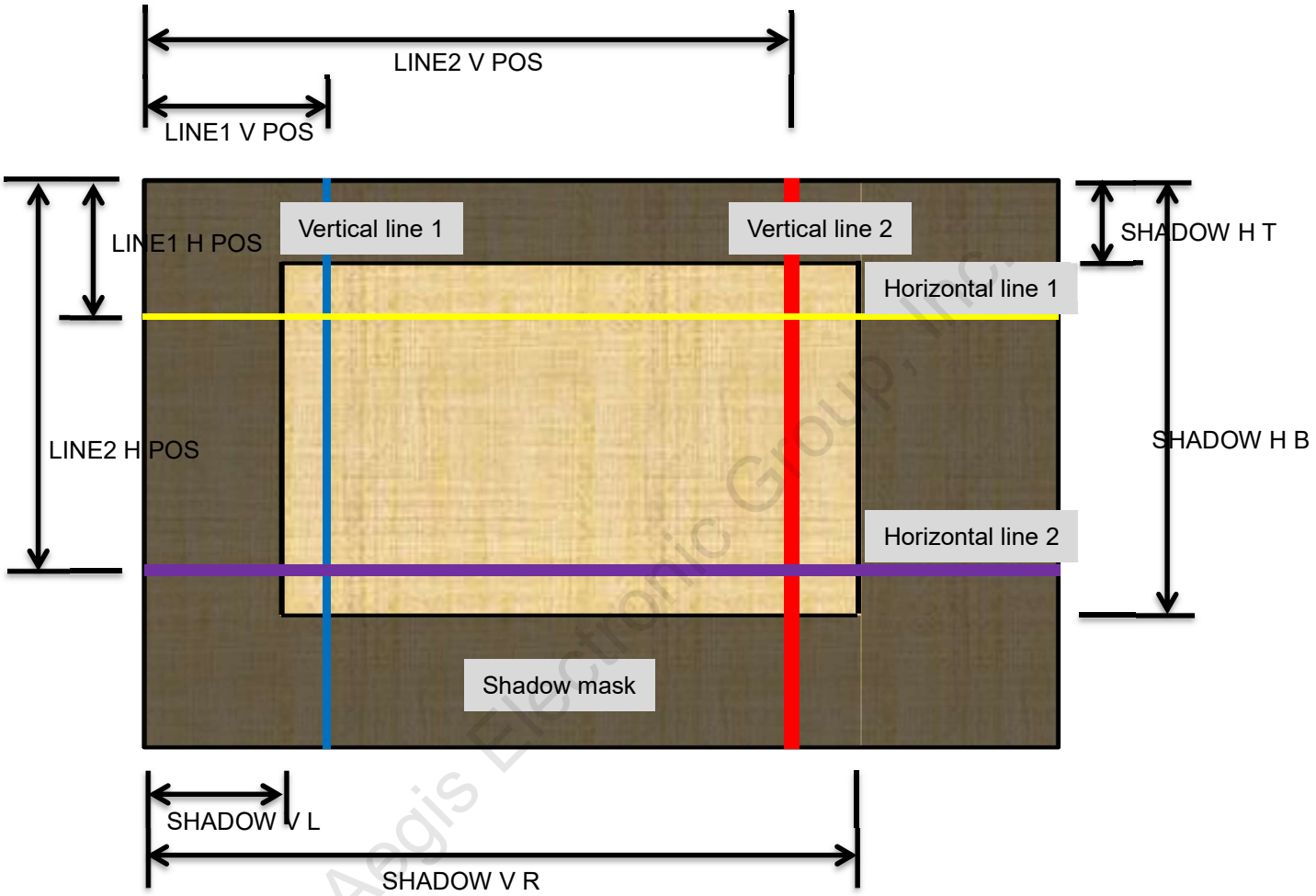
Sets the position for the bottom area o
Setting range: 0 (Top) to 1,080 (Botton
Default: 0

d) SHADOW V L

Sets the position for the left area of the
Setting range: 0 (Left) to 1,919 (Right)
Default: 0

e) SHADOW V R

Sets the position for the right area of the shadow mask.
Setting range: 0 (Left) to 1,920 (Right)
Default: 0



4) CIRCLE

Selects enable or disable for the circle maker display (Default: ON).
This setting is only valid when “GRAPHICS” is “ON”.

a) ON

The circle maker can be display.
Sets the radius, the line size (thickness), the center position and the color for the circle maker.

b) OFF

The circle maker does NOT display.

5) Circle maker settings

Sets the radius, the size (thickness), the center position and the color for the circle maker.

a) RADIUS

Sets the radius for the circle.
Setting range: 000 (Filled circle) to 960
Default: 000

b) SIZE

Sets the size (thickness) for the circle.
Setting range: 0 (0, no circle) to 480
Default: 000

c) H POS

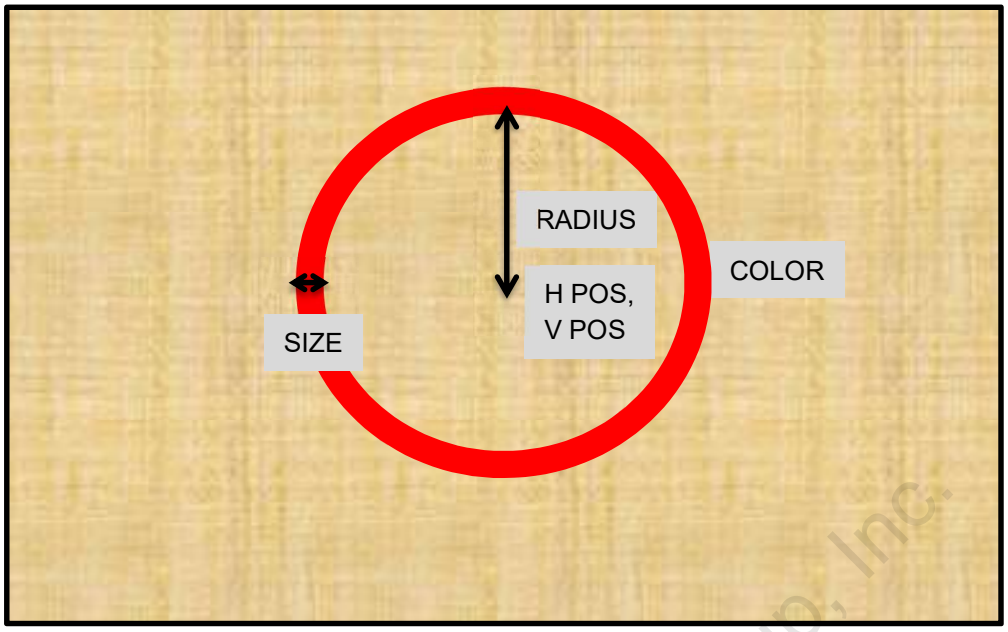
Sets the horizontal center position for the circle.
Setting range: 000 (Left end) to 1,920 (Right end)
Default: 960

d) V POS

Sets the vertical center position for the circle.
Setting range: 000 (Top) to 1,080 (Bottom)
Default: 540

e) COLOR

Sets the color for the circle.
It is necessary to set the USER0 to USER7 colors with the PC communication.
Setting selection: BLACK / WHITE / RED / GREEN / BLUE / CYAN / MAGENTA / YELLOW /
USER0 / USER1 / US
Default: BLACK



Page 5

PAGE 1 2 3 4 **5** 6	
RES / FPS	1080P60
OSD SIZE	LARGE
PROFILES	PRESET0
PATTERNS	OFF
IMAGE OUTPUT	STANDARD

1) RES / FPS

Sets the image format and the frame rate for the video output from below nine output formats.
Please changes the video output format and the frame rate to match the specifications for the monitor or the capture devices. If the monitor or the capture devices does NOT support 1080P60, the video output format and the frame rate can be change with the PC communication.
Setting selection: 1080P60 / 1080P30 / 1080P50 / 1080P25 / 720P60 / 720P50 / 1080P59.94 / 1080P29.97 / 720P59.94
Default: 1080P60

2) OSD SIZE

Sets the character size of OSD (Default: LARGE).

a) LARGE

OSD display with the large character.

b) SMALL

OSD display with the small character.

3) PROFILE

Preset data PRESET0 to PRESET7 can be apply to the camera. (Default: PRESET0)
To change the PRESET, select PRESET and use SAVE function after change the settings.
Setting selection: PRESET0 / PRESET1 / PRESET2 / PRESET3 / PRESET4 / PRESET5 / PRESET6 / PRESET7
Default: PRESET0

a) PRESET0 to PRESET7

The settings of the selected preset are

4) PATTERNS

Selects the output signal from below four output signals.

a) OFF

The video is output from the camera.

b) GRAY

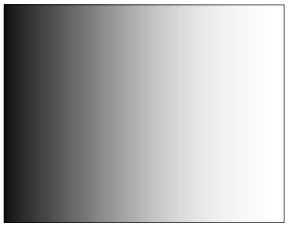
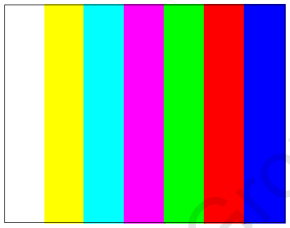
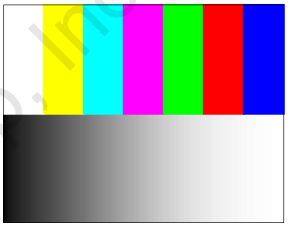
The gray scale test pattern is output from the camera.

c) COLOR

The color test pattern is output from the camera.

d) GRAY+COLOR

The color pattern (Top) + gray scale (Bottom) test pattern is output from the camera.

5) IMAGE OUTPUT

Selects the flip image setting for the video output from below four flip modes.
This setting does NOT apply for the test pattern outputs.

a) STANDARD

The normal image (no-flip).

b) INVERSION

The horizontal flip image.

c) V INVERSION

The vertical flip image.

d) HV INVERSION

The horizontal and the vertical flip (180 deg. rotate) image.

Page 6

PAGE 1 2 3 4 5 **6**
EEEPROM SAVE

1) EEPROM
The camera settings in the page1 to page5 can be saved into the camera as the PRESET.
OSD SIZE and PATTERNS settings cannot be saved.
To change the PRESET, select PRESET and use this function after change the settings.

a) SAVE
When executing the “SAVE”, the confirmation message “ARE YOU OK?” is displayed.
When executing again, the settings save into the camera.
The message “COMPLETE” is displayed after the settings are saved.

9 Revisions

Rev	Date	Changes	Note
00	2014/03/20	New Document: Release Production model Added Camera instruction guide	
01	2014/04/28	Revised Added Pixel Blemish correction	
02	2014/06/27	Revised Added Weight of SDI model Changed company name	
03	2014/07/14	Revised Updated Minimum scene illumination	
04	2014/10/10	Revised Marked Lens information	
05	2014/12/02	Revised Added Support only Level-A(SMPTE424M-A) on 3D-SDI	
06	2015/01/15	Revised Information on 3D-SDI	
07	2015/08/18	Revised Added CS-Mount Added Circle Marker and Still image on Push button function list Added Description of OSD	
08	2017/07/03	Revised Change the name of company	
09	2019/02/26	Revised Revised Environmental Specifications (Standard Compliancy)	
10	2019/02/27	Revised Added trademark information	

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