

# SENTECH

## 1080p HD Auto Focus Camera Product Specifications

### Features

- HD1080p Resolution
- 60 FPS
- LVDS or SDI Output

---

## 1 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 the 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**
- **Apply the power that satisfies the requirements specified in this document to the camera.**
- **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.**
- **The camera is a general-purpose electronic device; using the camera for the equipment that may threaten human life or cause dangers to human bodies directly in case of failure or malfunction of the camera is not guaranteed. Use the camera for special purposes at your own risk.**

---

# Contents

<b>1</b>	<b>PRODUCT PRECAUTIONS.....</b>	<b>2</b>
<b>2</b>	<b>INTRODUCTION.....</b>	<b>6</b>
2.1	Features .....	6
2.2	Naming Method .....	6
2.3	Peripheral Equipment .....	6
<b>3</b>	<b>SPECIFICATIONS .....</b>	<b>7</b>
3.1	Electronic specifications / Mechanical specifications / Environmental specifications.....	7
3.2	Spectral Sensitivity Characteristics .....	8
3.3	Support Option .....	8
3.4	External Connector Specifications .....	9
3.4.1	LVDS Model .....	9
3.4.2	SDI Model .....	10
<b>4</b>	<b>DIMENSIONS .....</b>	<b>13</b>
4.1	STC-AF243LVD .....	13
4.2	STC-AF243SDI .....	14
<b>5</b>	<b>USERS GUIDE FOR THE COMMUNICATION SOFTWARE .....</b>	<b>15</b>
5.1	The required software and the JIG .....	15
5.2	The basic operation procedure .....	15
5.3	The descriptions for the buttons .....	16
5.4	The difference between the uCOM register and the DSP register .....	16
5.5	The descriptions for the functions .....	16
	uCOM:Standard Tab .....	16
	DSP: Shutter/Gain Tab.....	18
	DSP: WB.....	21

DSP: AutoICR .....	22
DSP: Gamma .....	23
DSP: AE Other .....	24
DSP: Other .....	25
uCOM: Motion Detection .....	27
DSP: Marker.....	28
DSP: Privacy Mask .....	29
uCOM: User Color.....	29
uCOM: Other .....	29
uCOM: Push Button .....	31
uCOM: UART .....	31
uCOM: ReadOnly.....	31
OSD Command Test .....	32
Blemish Pixel.....	32
COM: AFAOI .....	32
Field: Table .....	32

## **6 PROTOCOL SPECIFICATIONS..... 33**

### **6.1 Communication settings..... 33**

### **6.2 Communication format .....** 33

### **6.3 Camera Control Commands .....** 34

#### **6.3.1 The Command List for the Communication .....** 34

#### **6.3.2 Slave address for the ICs (8 bits) list.....** 36

#### **6.3.3 The error code list.....** 36

### **6.4 The uCOM register mapping list .....** 37

AF AOI (Area Of Interest)..... 44

Zoom table .....

Focus table..... 44

Zoom trigger auto focus and interval auto focus operation..... 45

Temperature sensor data table .....

#### **6.4.1 Push button fuctions for the display menu.....** 46

#### **6.4.2 Push button function list .....** 46

### **6.5 DSP register mapping list.....** 47

Descriptions for the white balance mode .....

Descriptions for ALC control .....

Descriptions for Auto IR cut filter control..... 58

IR light wavelength..... 58

The example settings for the privacy mask..... 66

Caution for the privacy mask .....

Color code list .....

### **6.6 OSD (On Screen Character Display) command .....** 67

#### **6.6.1 Command .....** 67

Display control..... 67

Character size .....

Character cursor .....	67
Property cursor.....	67
Character (Character control) .....	68
Property.....	68
Character array (Character control) .....	68
Property array .....	68
Property for character array .....	68
<b>6.6.2 Sample command .....</b>	<b>69</b>
Sending command .....	69
Character display .....	69
<b>7 CAMERA SETTING GUIDELINE .....</b>	<b>70</b>
<b>7.1 Camera setting via external switch(SDI model only) .....</b>	<b>70</b>
<b>7.1.1 Camera setting via switch connect to CN06 .....</b>	<b>70</b>
<b>7.1.2 OSD display with external switch .....</b>	<b>71</b>
Page 1 .....	71
Page 2 .....	73
Page 3 .....	75
Page 4 .....	76
Page 5 .....	77
Page 6 .....	78
Page 7 .....	79
Page 8 .....	80
<b>7.2 LVDS Interface (LVDS model only) .....</b>	<b>81</b>
<b>7.2.1 LVDS Pixel Data Format .....</b>	<b>81</b>
<b>7.2.2 Example of receiver Circuite .....</b>	<b>83</b>
<b>8 REVISION HISTORY .....</b>	<b>84</b>

## 2 Introduction

This document describes the specification of the following cameras:

[LVDS Output]  
STC-AF243LVD

[SDI Output]  
STC-AF243SDI

### 2.1 Features

- **1080poutput CMOS Sensor**
- **x 20 Zoom Lens**
- **Auto Focus, Auto IRIS**
- **Day & Night function**
- **LVDS, SDI output**
- **OSCD(On Screen Character Display)**
- **Configurable parameters through Control Software**
- **Eight configurable DSP files can be saved**
- **Wide Dynamic Range (ATR-EX),Defog**
- **Pixel Blemish Correction**
- **Multi-Protocol support (Sentech, and another protocol)**

### 2.2 Naming Method

# STC-AF243xx



**Back Panel**  
LVD: LVDS Output  
SDI: SDI Output

### 2.3 Peripheral Equipment

**Sentech provide as follow peripheral equipment**

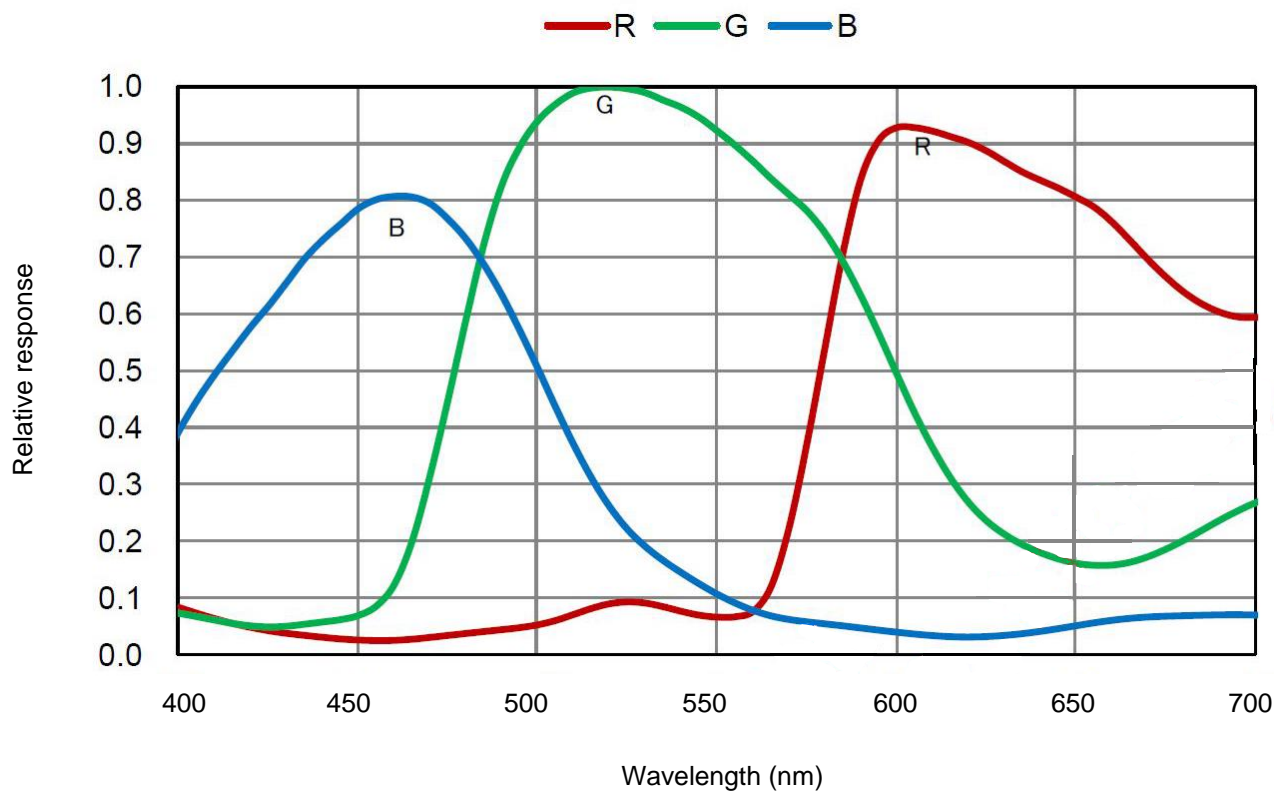
- ① **Control Software : KGACtrl**

## 3 Specifications

### 3.1 Electronic specifications / Mechanical specifications / Environmental specifications **Bold: Initial Value**

Product		STC-AF243*	
Electronic	Imager	1/2.8" 2.3Mega pixel CMOS (SONY: IMX136), Rolling Shutter	
	Active picture elements	1936 (H) x 1096 (V)	
	HD active picture elements	1920 (H) x 1080 (V)	
	Optical size	5.44 (H) x 3.09 (V) mm	
	Cell size	2.8 (H) x 2.8 (V) $\mu\text{m}$	
	Sync system	Progressive	
	Minimum scene illumination	1.4 Lux @F1.6, with IRC filter, Exposure time 1/60 sec	
	Sync. System	Internal	
	Video output	LVDS Model	1080P60//50/30/, 720P60/(59.94)/50 Default :1080P60
		SDI Model	3G-SDI(Physical layer: SMPTE 424M, Data Mapping: SMPTE 425M Level-A Compliant), 4:2:2 YCbCr 10bit 1080P60/(59.94)/50HD-SDI (SMPTE292M Compliant) 4:2:2 YCbCr 10bit 1080P30/(29.97)/25,720P60/(59.94)/50
	Camera functions	ALC	Electrical shutter / AGC / Mechanical IRIS linkage Default : ALC ON
		Shutter speed	1/60~1/10,000 seconds Default :fixed <b>1/100</b>
		Gain	AGC / Fixed gain 0 to 45 dB Default : AGC
		Gamma	Selectable gamma through 5 preset (one preset is manual, / 0.45 / 0.6 / 0.8 / 1) Default : Manual
		White balance	Auto white balance / Manual white balance / Push to set white balance Default : Auto white balance
		Mirror image	Normal image / Horizontal flip / Vertical flip / Horizontal vertical flip(180 degree rotation) Default: Normal image
		DSP Preset	8 user preset mode Default : Preset 0
		Line generator	Both horizontal and vertical with all available colors (Line number: 2) Default : Disable
		Shadow mask generator	Both horizontal and vertical with shading level adjustment Default : Disable
		Privacy mask	8 windows with all available colors, width, position Default : Disable
		Communication	UART communication (RS232C +3.3V,RS485 +5V) (Boudrate: 115,200bps,38,400bps, 19,200bps, 9,600bps)
		Character generator	Built-in character generation function via the UART communication
		Another	Pixel blemish collection, WDR, Defog, Hue, Brightness, Contrast etc.
		Lens control	
	Optical zoom		UART communication(LVDS model / SDI model), Zoom function can be controlled through External control (SDI model)
	Focus		Auto focus / Manual focus / Push set focus (Selectable control via the UART communication) Default : Auto focus
	IRIS		Auto IRIS / Manual IRIS / Push set IRIS (Selectable control via the UART communication) Default : Auto IRIS
ICR (IR Cut filter Removable)	Selectable IR cut filter Auto / Manual (Selectable control via the UART communication) Default : Manual		
Power	Input voltage		+9 to +15 Vdc (Typical: +12 Vdc)
	Consumption		Zoom and Focus: 3.5W, Zoom and Disable-focus: 3.2W
Mechanical	Dimensions		53 (W) x 60 (H) x 89.5(D) mm
	Auto focus lens		20x auto focus zoom lens, Demountable IR cut filter Optical zoom range: from 4.7mm to 94mm (F No.1.6~3.0)
	Optical filter		OPLF on
	Interface connector	Video output	LVDS model : CN02(USL00-30L-C,KEL),SDI model : RF(MM9329-2700 cable Murata)
		Power input, External control UART communication	LVDS model : CN02(USL00-30L-C,KEL) SDI model : CN06(SM14B-SRSS-TB,JST)
Weight	LVDS: Approximately 300g, SDI: Approximately 300g		
Environmental	Operational temperature	0 to 45 deg. C	
	Storage temperature	-30 to 65 deg. C	
	Vibration	5Hz to 25Hz to 5Hz (4min./cycle), amplitude 2mm , XYZ 3 directions 60 min. each) to	
	Shock	Acceleration 60G, half amplitude 11ms, XYZ 3 directions 1times each	
	RoHS	RoHS compliance	

### 3.2 Spectral Sensitivity Characteristics



### 3.3 Support Option

As following features can be supported as option.

- ① Resolution / Frame rate: 1080P 59.94 / 29.97, 720 / 59.94
- ② Serial Communication : LVDS model 5V TTL
- ③ Accuracy of temperature sensor : Range: -10°C to 100°C, Accuracy±1°C



### 3.4 External Connector Specifications

#### 3.4.1 LVDS Model

CN02: Connector model number : USL00-30L-C,KEL

#### Pin assignment

No.	Signal
1	TD1+
2	TD1-
3	TCLK1+
4	TCLK1-
5	TC1+
6	TC1-
7	TB1+
8	TB1-
9	TA1+
10	TA1-
11	GND
12	TXD
13	RXD
14	+12V
15	+12V

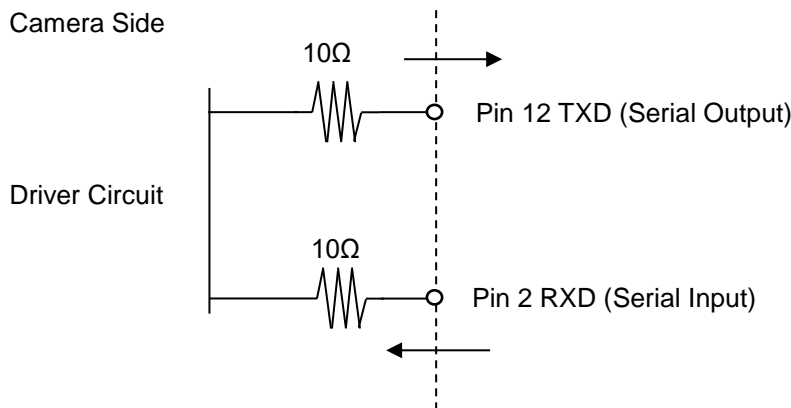
No.	Signal
16	+12V
17	+12V
18	+12V
19	GND
20	GND
21	TD2+
22	TD2-
23	TC2+
24	TC2-
25	NC
26	RESET
27	TB2+
28	TB2-
29	TA2+
30	TA2-

LVDS Connector (Pin1 to 10, 21 to 24, 27 to 30)

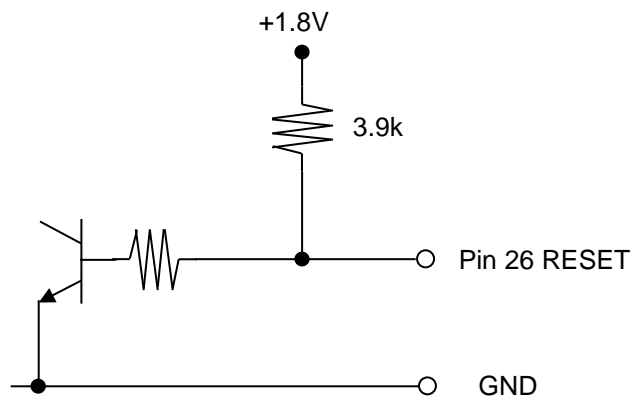
As for the detail, please refer to another chapter 6.6.2 LVDS Interface.

Serial Communication port (Pin 12,13)

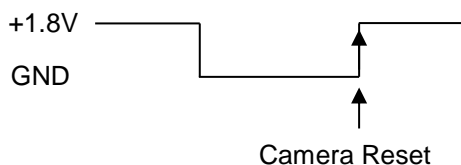
Signal Level on Input and Output: 3.3V CMOS Level (\* 5V TTL Level can be supported as option)



### RESET Input Port(Pin 26)



### RESET Input Signal



\* This camera can be reset through Low to High on RESET Pin.

### 3.4.2 SDI Model

#### Video Signal Output Cable

Cable Model Number: Murata MXTK92TK2000  
 Applicable Connector : Murata MM9329-2700

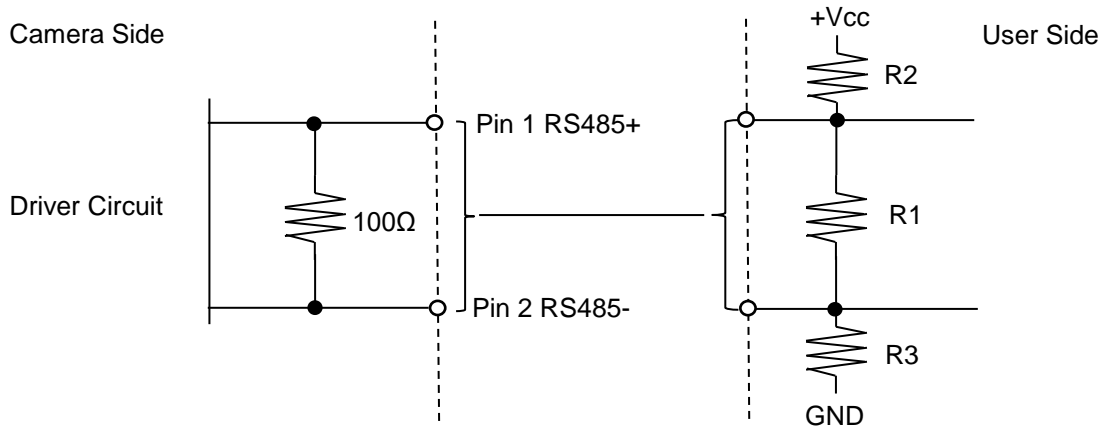
Connector model number: SM14B-SRSS-TB, JST

#### Pin Assignment

No.	Signal
1	RS485 +
2	RS485 -
3	+12V
4	+12V
5	GND
6	GND
7	N.C.
8	N.C.
9	KEY ENTER
10	KEY UP
11	KEY DOMN
12	KEY LEFT
13	KEY RIGHT
14	POWER LED

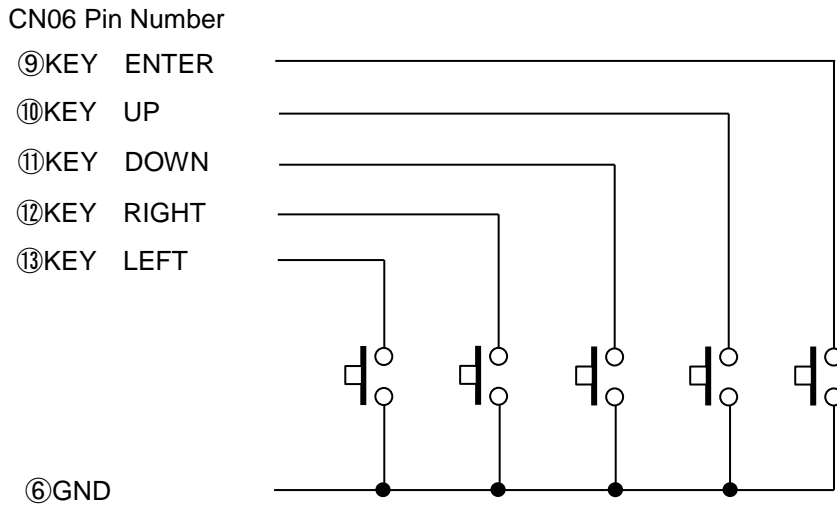
## RS485 Input Output Port

Common Mode Range:  $-7V$  to  $+12V$



Please assign termination register (R1), pull up register on RS-485 (R2), pull down register on RS-485(R3) if necessary.

### KEY Connector circuit diagram (e.g. User side)

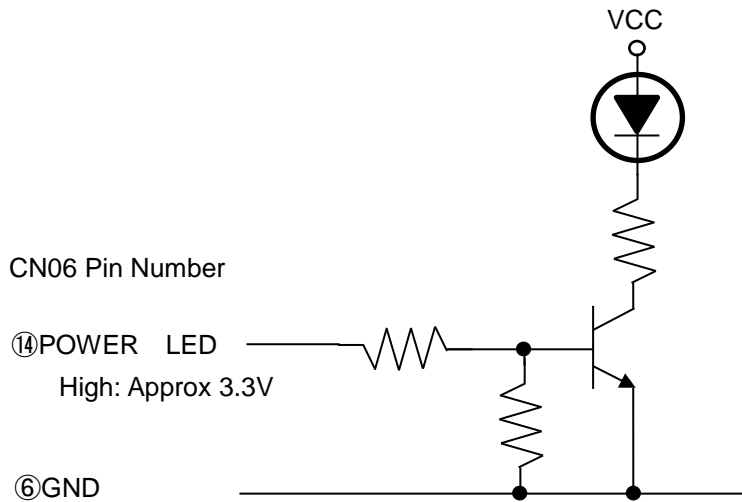


As for the manipulation of KEY, please refer to another chapter.

### POWER LED Connector circuit diagram (e.g. User side)

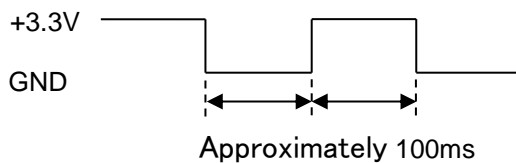
**This port outputs High when camera is turned ON. Camera status can be read through LED via transistor and so on.**

Pin 14 outputs 3.3V CMOS Level and have to be less than 2mA.



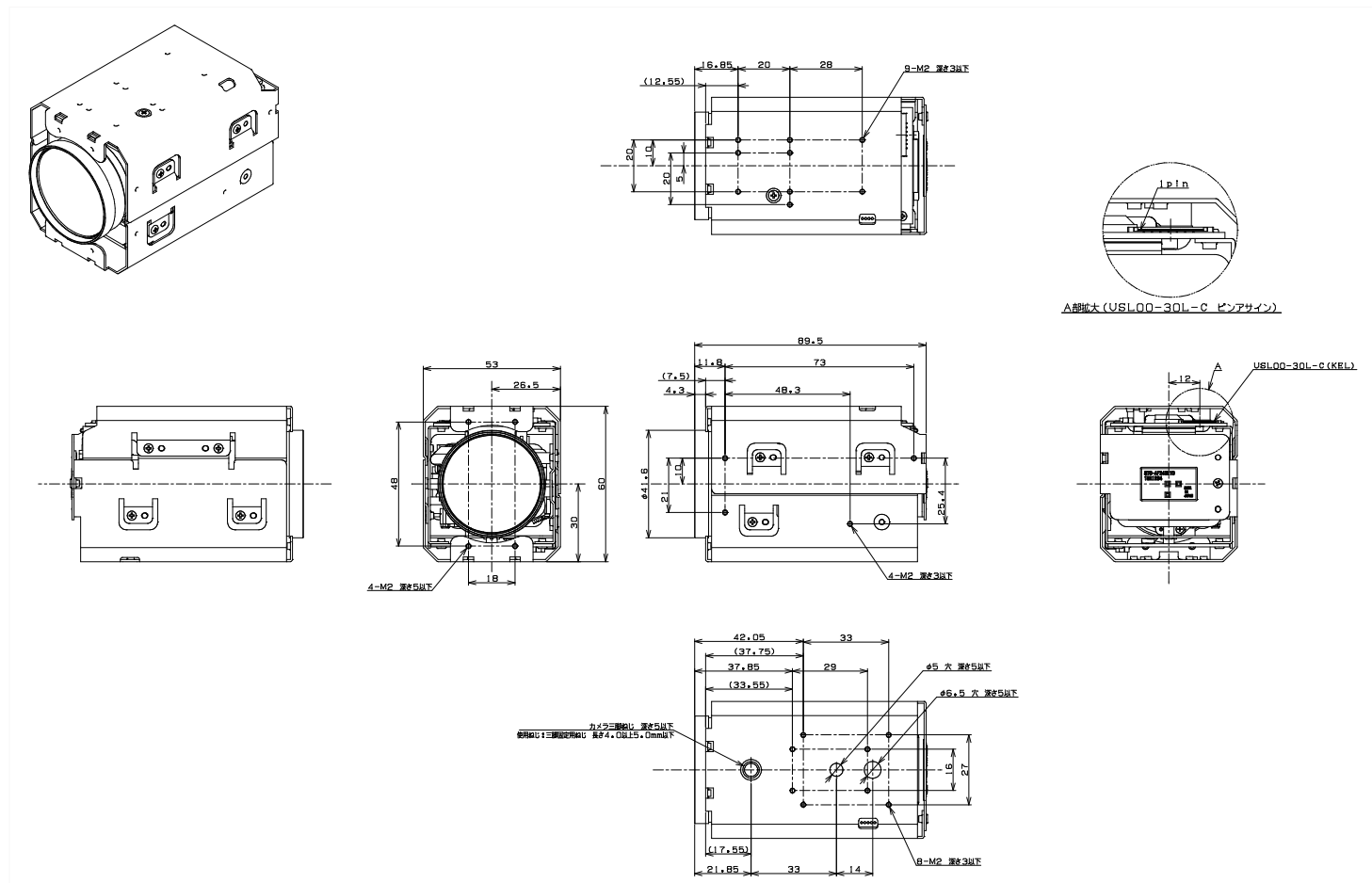
Note) If the camera works under an abnormal condition, an approximate 100mHz High – Low signal will be outputted.

POWER LED output wave form under abnormal condition



## 4 Dimensions

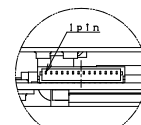
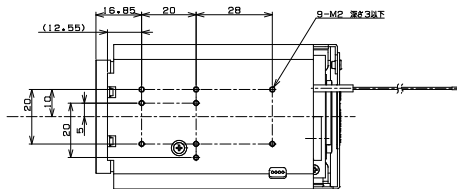
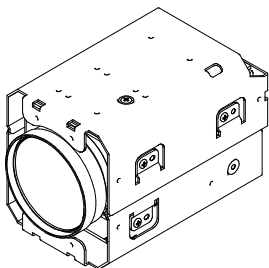
### 4.1 STC-AF243LVD



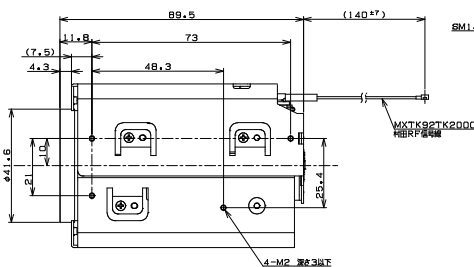
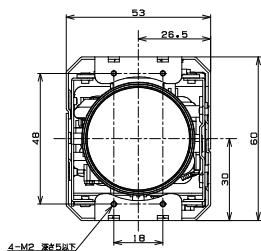
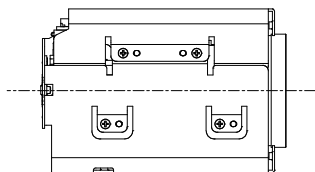
unit : mm

\*Note: Please use 4.0mm to 5.0mm length screw to fix the camera on the tripod. We recommend to use tripod screw or M2 screw to fix the camera.

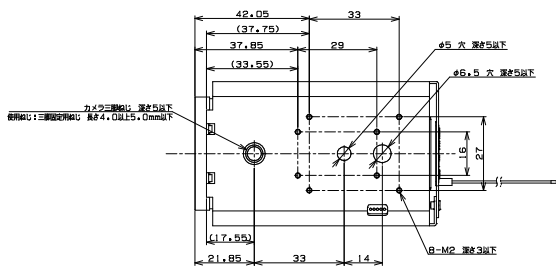
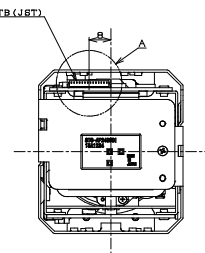
## 4.2 STC-AF243SDI



A部拡大 (SM14B-SR6S-TB ビンサイン)



SM14B-SR6S-TB (J&T)



unit : mm

\*Note: Please use 4.0mm to 5.0mm length screw to fix the camera on the tripod. We recommend to use tripod screw or M2 screw to fix the camera.

## 5 Users guide for the communication software

### 5.1 The required software and JIG

- **Communiation software: KGACtrl**

LVDS model

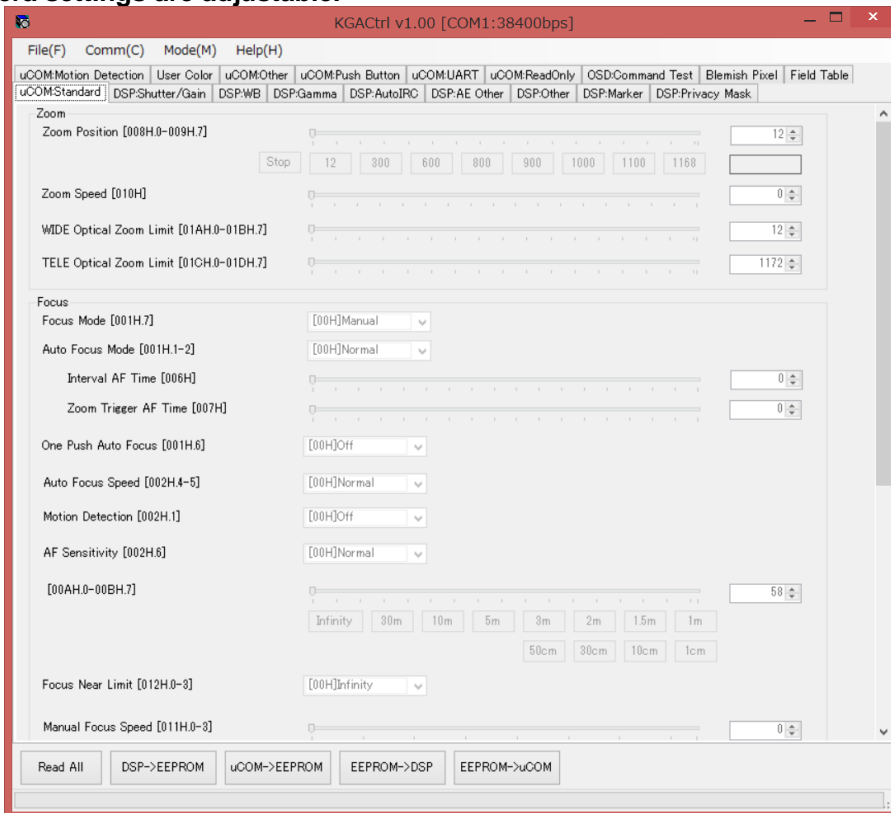
Connect camera's TXD to PC's serial input signal and connect camera's RXD to PC's serial output signal.  
Signal Level is 3.3V CMOS (\*5V TTL can be supported as option)

SDI model

Connect camera's RS485+/RS485- port to PC's RS485+/- signal.

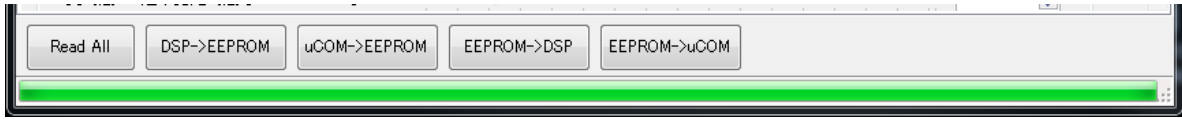
### 5.2 The basic operation procedure

- ① **Power on the camera then connect the communication JIG to the camera. Then connect the communication JIG to the PC with the USB cable.**
- ② **Install KGACtrl software. KGACtrl communication software starts when running KGACtrl.exe.**
- ③ **Select COM Port with "Port Setting" under "Comm(C)" in the menu.**
- ④ **Select "Read All" button which is located at the bottom-left in the software to load the camera settings to the PC.**
- ⑤ **The camera settings are adjustable.**



**Fig 1: KGACtrl start up window**

### 5.3 The descriptions for the buttons



#### Read All

The settings of DSP registers and uCOM registers are loaded from the camera.  
Please MUST select this button after power on the camera.

#### DSP -> EEPROM

The settings of DSP registers, which is the settings in “DSP:xxx” window, are saved to the EEPROM on the camera.

#### uCOM -> EEPROM

The settings of uCOM registers, which is the settings in “uCOM:xxx” window, are saved to the EEPROM on the camera.

#### EEPROM -> DSP

The settings of DSP registers, which is the settings in “DSP:xxx” window, are loaded from the EEPROM on the camera.

#### EEPROM -> uCOM

The settings of uCOM registers, which is the settings in “uCOM:xxx” window, are loaded from the EEPROM on the camera.

### 5.4 The difference between the uCOM register and the DSP register

- The settings that are related to the image are in the DSP registers.
- The settings that are related to the lens control, the communication and the button functions are in the uCOM registers.
- The DSP registers have eight user preset files and are selectable.

### 5.5 The descriptions for the functions

#### uCOM:Standard Tab



#### Zoom Position

Set the zoom position.

#### Zoom Speed

Set the zoom speed.

#### WIDE Optical Zoom Limit

Set the optical zoom position limit for the WIED. It is necessary to set a value smaller than the value of “TELE Optical Zoom Limit”.

#### TELE Optical Zoom Limit

Set the optical zoom position limit for the TELE. It is necessary to set a value greater than the value of “TELEOptical Zoom Limit”.



### Focus Mode

Select auto focus or manual focus for the focus mode.

### Auto Focus Mode

Select normal mode, interval AF mode or Zoom trigger mode for the auto focus mode.

### Interval AF Time

Set the time for interval AF mode.

### Zoom Trigger AF Time

Set the time for zoom trigger AF mode.

### One Push Auto Focus

Execute the push to set auto focus.

### Auto Focus Speed

Set the speed for the auto focus at TELE.

### Motion Detection

Select to enable or disable the motion detection function.

### AF Sensitivity

Set the sensitivity to start auto focus function.

### Focus Distance

Set the focus distance. This is only valid when manual focus mode is selected.

### Focus Near Limit

Set the minimum distance for focus at NEAR.

50cm to 1cm setting is valid at WIDE. The minimum distance at TELE is 1m.

### Manual Focus Speed

Set the focus speed for manual focus mode.

The screenshot shows a control panel for the Iris function. It includes the following settings:

- Iris Mode [001H.5]**: [00H]Manual
- One Push Auto Iris [001H.4]**: [00H]Off
- Iris Position [00CH.0-00DH.7]**: Slider set to 0
- Auto Iris Minimum Position [020H.0-021H.7]**: Slider set to 0
- Auto Iris Maximum Position [022H.0-023H.7]**: Slider set to 0
- Auto Iris Tolerance [024H]**: Slider set to 0
- Auto Iris Threshold [025H]**: Slider set to 0
- Auto Iris Step Multiplier [026H]**: Slider set to 0
- Auto Iris Step Divisor [027H]**: Slider set to 0
- Auto Iris Maximum Changing Value [01EH.0-01FH.7]**: Slider set to 0
- Auto Iris Skip Count [059H.0-05AH.7]**: Slider set to 0

**Iris Mode**

Select auto iris or manual iris for iris mode.

**One Push Auto Iris**

Execute the push to set iris.

**Iris position**

Set the iris open ratio for the manual iris mode.

**Auto Iris Minimum Position**

Set the minimum iris open ratio for the auto iris mode.

**Auto Iris Maximum Position**

Set the maximum iris open ratio for the auto iris mode.

**Auto Iris Tolerance**

Set the tolerance to start the iris control for the auto iris mode.

**Auto IRIS Threshold**

Set the threshold to stop the iris control for the auto iris mode.

**Auto Iris Step Multiplier, Auto Iris Step Divisor, Auto Iris Maximum Changing Value and Auto Iris Skip Count**

Set the iris control speed for the auto iris mode.

DSP: Shutter/Gain Tab

**ALC (Auto Luminance Control)**

The screenshot shows the ALC control panel with the following settings:

- ALC Target Level [092H.0-093H.7]**: Slider set to 0
- ALC Luminance Average Frame [098H]**: Slider set to 0

**ALC Target Level**

Set the target brightness level for the ALC function. The ALC maintains the brightness at this value.

**ALC Luminance Average Frame**

Set the number of frames used for the ALC function.

## Shutter

The screenshot shows a control panel for the 'Shutter' function. At the top, there is a dropdown menu for 'Shutter Control [090H.6]' set to '[00H]Manual Shutter'. Below this are several sliders and buttons for setting exposure times. The 'Shutter time [016H.0-017H.7]' slider is set to 1, with buttons for 1/60, 1/100, 1/120, 1/200, and 1/500. Other sliders include 'AEE Minimum Shutter Time [0A2H.0-0A3H.7]' (set to 1), 'AEE Maximum Shutter Time [0A8H.0-0A9H.7]' (set to 1), 'AEE Tolerance [0AAH]' (set to 0), 'AEE Threshold [0ABH]' (set to 0), 'AEE Speed [0ACH]' (set to 0), and 'AEE Skip Count [099H.0-3]' (set to 0).

### Shutter Control

Select to enable or disable the AE (Auto Exposure control) function.

### Shutter Time

Set the exposure time when AE is OFF (Disable).

### AEE Minimum Shutter Time and AEE Maximum Shutter Time

Set the minimum and the maximum exposure time for the AE function.

### AEE Tolerance

Set the tolerance to start the AE function.

### AEE Threshold

Set the threshold to stop the AE function.

### AEE Speed and AEE Skip Count

Set the speed for the AE function.

## Gain

The screenshot displays a configuration window for Gain control. At the top, there is a dropdown menu labeled "[00H]Manual Gain" with a downward arrow. Below this, there are nine rows of controls, each with a label, a hexadecimal range in brackets, a slider, and a numeric input field. The parameters are:

- Gain Control [090H.7]: [00H]Manual Gain (dropdown)
- Gain [018H.0-019H.7]: Slider and numeric input (0)
- AGC Minimum Gain [0C2H.0-0C3H.7]: Slider and numeric input (0)
- AGC Maximum Gain [0C6H.0-0C7H.7]: Slider and numeric input (0)
- AGC Tolerance [0C8H]: Slider and numeric input (0)
- AGC Threshold [0C9H]: Slider and numeric input (0)
- AGC Speed [0CAH]: Slider and numeric input (0)
- AGC Step Multiplier [0CBH]: Slider and numeric input (0)
- AGC Step Divide [0CCH]: Slider and numeric input (0)
- AGC Skip Count [099H.4-7]: Slider and numeric input (0)

### Gain Control

Select to enable or disable the AGC function.

### Gain

Set the gain when the AGC function is off (Disabled).

### AGC Minimum Gain

Set the minimum gain for the AGC.

### AGC Maximum Gain

Set the maximum gain for the AGC.

### AGC Tolerance

Set the tolerance to start the AGC.

### AGC Threshold

Set the threshold to stop the AGC.

### AGC Speed, AGC Step Multiplier, AGC Step Divide and AGC Skip Count

Set the speed for the AGC.

**DSP: WB**



**White Balance Mode**

Select the Auto White balance, the Full Open, the AWB Hold, the Custom color temperature and the USER mode for the White Balance Mode.

Please use USER mode for manual white balance.

**AWB Pull-in Speed**

Set the white balance process speed (Unit: Number of the frame).

This is valid when the Auto White Balance or the Full Open is selected for the white balance mode.

**AWB Pull-in Delay**

Set the number of frames to restart the auto white balance process for the auto white balance mode.

**AWB Convergence Step inside target area**

Set the convergence step for the auto white balance target neighbor to stop the white balance adjustment process. The white balance adjustment speed is faster when a smaller value is set.

**AWB Convergence Step outside target area**

Set the convergence step for the outside area of the auto white balance target neighbor to stop the white balance adjustment process.

The white balance adjustment speed is faster when a smaller value is set.

**Auto White Balance Offset, R/G, B/G**

Adjust White balance to set the color offset on AWB.

## USER Mode

Set the manual white balance. These settings are valid when the USER mode is selected for the white balance mode.

## Custom Target Color Temperature

Adjust the white balance manually based on the color temperature. The display value is the approximate color temperature.

## DSP: AutoICR

### IRC Filter

Select the IR cut filter on or off manually. This is valid when the auto IRC filter control is off (Manual).

### Auto IRC Filter Control

Select the IR cut filter on or off automatically.

### IRC Filter Interlock with BW

Select on or off to switch the monochrome image automatically when the IR cut filter is off.

### IR Light Wavelength

Sets the wave length of IR light when the IR light is using. The focus tracking performance while zooming is improved.

### Auto IRC Filter Disable Gain

Sets the gain threshold to the IR cut filter off for the auto IRC filter control.

### Auto IRC Filter Enable Gain

Sets the gain threshold to the IR cut filter on for the auto IRC filter control.

## DSP: Gamma

**Gamma**

Gamma Mode [043H.0-2] [00H]Manual

Gamma Output Selection [043H.3-4] [00H]Converted Output

**Gamma Curve**

**Manual Gamma**

Gamma KNOT00 <input type="text" value="0"/>	Gamma KNOT14 <input type="text" value="0"/>
Gamma KNOT01 <input type="text" value="0"/>	Gamma KNOT15 <input type="text" value="0"/>
Gamma KNOT02 <input type="text" value="0"/>	Gamma KNOT16 <input type="text" value="0"/>
Gamma KNOT03 <input type="text" value="0"/>	Gamma KNOT17 <input type="text" value="0"/>

### Gamma Mode

Select the manual or the presets (0.45, 0.6, 0.8 or 1.0) for the gamma mode.  
 The gamma curve that cleats by the manual gamma is applied for the manual gamma mode.

### Gamma Output Selection

Select the gamma converted image or not converted image as the output from the camera.  
 The gamma setting is applied when the gamma converted image output is selected.

### Gamma Offset

Adjust the Gamma offset level that is selected on Gamma Mode.  
 Note: The Gamma Curve on KGACtrl does not reflect this adjustment.

## DSP: AE Other

Photometry mode

Photometry mode [080H.0-1] [00H]Average photometry ▾

Weight photometry

0	0	0
0	0	0
0	0	0

0frame coefficient [081H]  0 ▾

1frame coefficient [082H]  0 ▾

2frame coefficient [083H]  0 ▾

3frame coefficient [084H]  0 ▾

4frame coefficient [085H]  0 ▾

5frame coefficient [086H]  0 ▾

6frame coefficient [087H]  0 ▾

7frame coefficient [088H]  0 ▾

8frame coefficient [089H]  0 ▾

Spot photometry

0	1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35
36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53
54	55	56	57	58	59	60	61	62

Spot photometry Window [08AH]  0 ▾

Spot photometry surrounding [08BH]  0 ▾

### Photometry Mode

The brightness level is maintained for the specific area of the image or the brightness level with the weight for the area or the histogram of the brightness. Select the average photometry, the emphasis photometry, the spot photometry or the backlight compensation.

For the average photometry, the average brightness level of the all images is used for the brightness adjustment. For the emphasis photometry, the weighted brightness of nine areas is used for the brightness adjustment.

For the spot photometry, the weighted brightness for the surrounded areas of the specific area is used for the brightness adjustment.



## DSP: Other

Resolution/FrameRate [040H.0-3]	[00H]1080p 60fps
Image Output Inversion [041H.0-1]	[00H]Standard
Sharpness Gain [07EH]	0
Wide Dynamic range [07FH.0-1]	[00H]OFF
Nega/Posi [07FH.2]	[00H]OFF
Shading Correction [07FH.3]	[00H]OFF
Color/Black and white [12AH.7]	[00H]Color
Contrast [129H]	0
Brightness [12DH]	0

### Resolution/FrameRate

Select the output format (resolution and the frame rate).

### Image output Inversion

Select the normal image, the horizontal flip image, the vertical flip image or the horizontal and the vertical flip image.

### Sharpness Gain

Set the sharpness gain.

### Wide Dynamic Range

This function avoids the clipped whites and the crushed shadows by compressing the low brightness and the high brightness areas to the middle brightness area and expand to the optimal gray scale.

The object visibility is improved for the hazy image with the contrast enhanced process when "Defog" is selected.

### Nega/Posi

Select the negative image or the positive image.

### Shading Correction

Select the enable and the disable for the shading correction function.

### Color/Black and White

Select the color image output or the monochrome image output for the camera.

### Contrast

Set the contrast.

### Brightness

Sets the brightness of the image.



**Noise Reduction**

**Noise Reduction**

0(weak)~5(strong) : Choose from 6 levels, reduction effect would be different from gain level.

6 : Fixed the level that was set on User Setting[0F9H]. reduction effect is the same as any gain level. This setting should be effective under lighting condition.

**Local Correlation**

Set the local correlation type of Noise Reduction level.

**Horizontal LPF**

Filtered on horizontal direction and do flat processing to reduce noise.



**Horizontal Aperture Level / Vertical Aperture Level**

The image edge is enhanced to improve the image resolution.

When the aperture level increases the image edge becomes strong, but the noise becomes more visible.



**Hue Adjustment**

Adjust the hue of the image.

**Saturation Adjustment**

Adjust the color saturation of the image.

## uCOM: Motion Detection

Setting

Frame 0 [014H.0]	[00H]OFF	Frame 0 Alarm Out [014H.4]	[00H]OFF
Frame 1 [014H.1]	[00H]OFF	Frame 1 Alarm Out [014H.5]	[00H]OFF
Motion Detection Threshold [015H]	<input type="range"/>		0
Interval Time [016H]	<input type="range"/>		0

### Frame 0 / Frame 1

Select to enable or disable for the motion detection frame to the alarm output.

### Motion Detection Threshold

Set the motion detection sensitivity threshold.

### Interval Time

Set the hold time (unit is second) for the result of the motion detection.

Frame

Frame 0 Height [1E0H.0-1E1H.7]	<input type="range"/>	0
Frame 0 Tilt [1E2H.0-1E3H.7]	<input type="range"/>	0
Frame 0 Width [1E4H.0-1E5H.7]	<input type="range"/>	0
Frame 0 Pan [1E6H.0-1E7H.7]	<input type="range"/>	0
Frame 1 Height [1E8H.0-1E9H.7]	<input type="range"/>	0
Frame 1 Tilt [1EAH.0-1EBH.7]	<input type="range"/>	0
Frame 1 Width [1ECH.0-1EDH.7]	<input type="range"/>	0
Frame 1 Pan [1EEH.0-1EFH.7]	<input type="range"/>	0

### Frame 0 Height, Frame 0 Tilt, Frame 0 Width, Frame 0 Pan, Frame 1 Height, Frame 1 Tilt, Frame 0 Width and Frame 1 Pan

Set the motion detection frame (Height, horizontal position, width and vertical position).

## DSP: Marker

The marker function is to display the horizontal line, the vertical line or the shadow mask on the image.

Marker

Marker [100H.7] [00H]Disabled

### Marker

Select to enable or disable the marker function.

Enable or disable the line maker and shadow mask individually when the marker function is enabled.

Line Marker

Line marker [100H.0] [00H]Disabled

Horizontal line1 marker color [10AH.4-7] [00H]Black

Horizontal line1 marker position [10BH.0-10CH.2] 0

Horizontal line1 marker thickness [10DH.0-10EH.2] 0

Vertical line1 marker color [10AH.0-3] [00H]Black

Vertical line1 marker position [10FH.0-110H.2] 0

Vertical line1 marker thickness [111H.0-112H.2] 0

Horizontal line2 marker color [113H.4-7] [00H]Black

Horizontal line2 marker position [114H.0-115H.2] 0

Horizontal line2 marker thickness [116H.0-117H.2] 0

Vertical line2 marker color [113H.0-3] [00H]Black

Vertical line2 marker position [118H.0-119H.2] 0

Vertical line2 marker thickness [11AH.0-11BH.2] 0

### Line Maker

Set the color, the position and the thickness individually for the two horizontal and two vertical lines.

Shadow Mask

Shadow mask [100H.1] [00H]Disabled

Shadow mask shading level [101H] 0

Horizontal shadow mask top position [102H.0-103H.2] 0

Horizontal shadow mask bottom position [104H.0-105] 0

Vertical shadow mask left position [106H.0-107H.2] 0

Vertical shadow mask right position [108H.0-109H.2] 0

### Shadow Mask

Set the area for the shadow mask.

The display priority is Shadow mask > Line maker 2 > Line maker 1.

DSP: Privacy Mask



**Mask Size linked by Zoom**

Select to enable or disable the privacy mask size and the position is linked with the zoom function.

To enable or disable, the color, the size and the position can be set for each individual privacy mask. The masking priority is Mask 0 > Mask 1 > ... > Mask 7 > Shadow mask > Line maker 2 > Line maker 1.

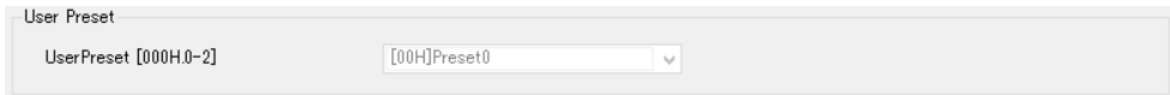
Please check the protocol information for more details.

uCOM: User Color



Define the custom color for the privacy mask or the line marker.

uCOM: Other



**UserPreset**

Select the DPS preset setting from eight DSP preset files (Preset 0 to Preset 7).

**OSD**

OSD menu color [050H.0-2]  ▾

OSD character size [050H.3]  ▾

OSD horizontal position [051H]  ▾

OSD vertical position [052H]  ▾

OSD Auto OFF Time [053H.0-054H.7]  ▾

Set the OSD for the external controller. This is only valid for the SDI model.

**Other**

LVDS Output [003H.1]  ▾

Dome Cover Correction [003H.2]  ▾

Dome Correction Level [013H]  ▾

Test pattern selection [055H.1-2]  ▾

RS485 External Control [003H.4]  ▾

### LVDS Output

Select the single link or the dual link for the LVDS output. This is only valid for the LVDS mode.

### Test pattern selection

Select the test pattern.

The OSD, the privacy mask, the line marker and the shadow mask cannot be changed while the test pattern is the output.

**Memory**

Initialize Memory [3E0H.0]  ▾

### Initialize Memory

The factory default setting can be loaded into EEPROM. When set enable, then the factory default data is overwritten into EEPROM and then camera is rebooted.

## uCOM: Push Button

### Button

Push button activation [00EH.0]	[00H]Disable
Menu: down [029H.0-3]	
Menu: up [029H.4-7]	
Menu: right [02AH.0-3]	
Menu: left [02AH.4-7]	
Menu: turn off [02BH.0-3]	

Select the function to be assigned to the buttons of the remote controller.

### Push button

External switch A function: single push [03AH]	[00H]Disabled
External switch B function: single push [03BH]	[00H]Disabled
External switch C function: single push [03CH]	[00H]Disabled
External switch D function: single push [03DH]	[00H]Disabled
External switch E function: single push [03EH]	[00H]Disabled

Select the function to be assigned to the push buttons.

## uCOM: UART

UART	
UART baud rate [00FH.0-1]	[00H]9600bps
UART short reply for write [00FH.6]	[00H]Disable
UART check sum [00FH.7]	[00H]Disable
Sentech Protocol [005H.0]	[00H]OFF
VISCA Protocol [005H.1]	[00H]OFF
Pelco D Protocol [005H.2]	[00H]OFF
VISCA Sentech protocol recovering address	<input type="text"/> 0
Pelco D Camera Address [082H]	<input type="text"/> 0

Set the communication settings.

## uCOM: ReadOnly

Firmware version [380H.0-381H.7]	<input type="text"/>
Internal Temperature [388H]	<input type="text"/>
FPGA version [382H.0-383H.7]	<input type="text"/>

Display the firmware version of the camera and the camera internal temperature.

## OSD Command Test

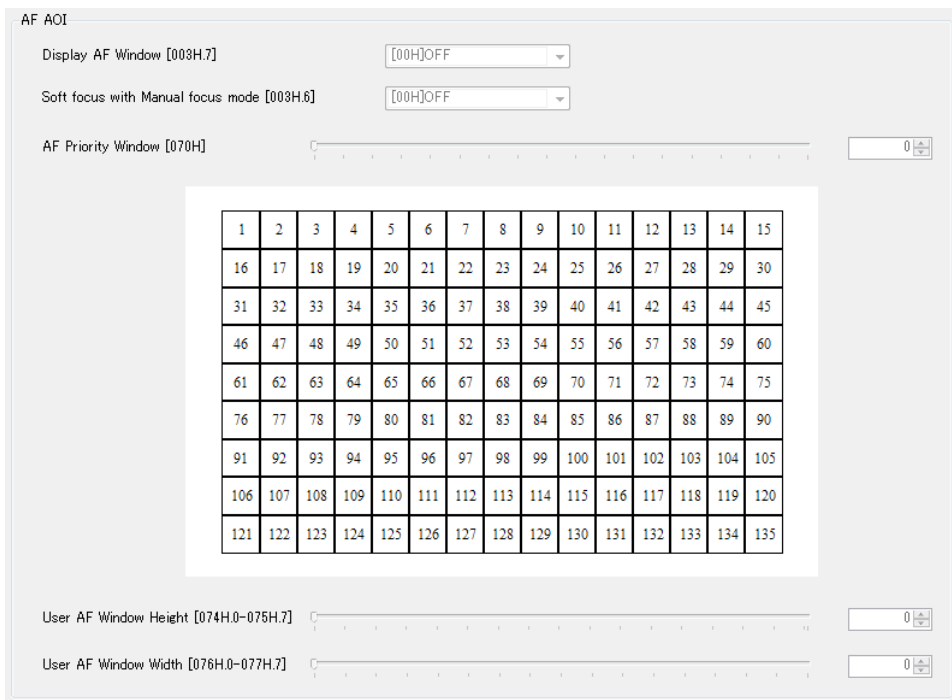
OSD command can be tested. Please check the protocol information for more details.

## Blemish Pixel



The white pixel blemish is corrected when “Auto Detect” button is selected.

## COM: AFAOI



Set the AF's position / size of primary focus area.

When Display AF Window :ON, selected detection window's position / size come up.

Note) Privacy mask 5 is not shown when Display AF Window :ON.

## Field: Table

Device	TabPage	Address	Name	EEPROM	Register
uCOM	Standard	001H.1-2	オートフォーカスモード	[00H]ノーマル	[00H]ノーマル
uCOM	Standard	001H.4	ワンタッチオートアイリス	[00H]オフ	[00H]オフ
uCOM	Standard	001H.5	アイリスモード	[01H]オート	[01H]オート
uCOM	Standard	001H.6	ワンタッチオートフォーカス	[00H]オフ	[00H]オフ
uCOM	Standard	001H.7	フォーカスモード	[01H]オート	[01H]オート
uCOM	Standard	002H.1	モーションディテクション	[00H]オフ	[00H]オフ
uCOM	Standard	002H.4-5	オートフォーカス速度	[02H]高速度	[02H]高速度
uCOM	Standard	002H.6	AF感度	[00H]ノーマル	[00H]ノーマル
uCOM	Standard	006H	インターバルAF時間	5	5
uCOM	Standard	007H	ズームトリガAF時間	5	5
uCOM	Standard	008H.0-009H.7	ズーム位置	12	12

Display the list of the settings.



## 6 Protocol specifications

### 6.1 Communication settings

Setting	Value
Baud rate	9,600 bps / 19,200 bps / 38,400 bps, 15,200 bps (Default: 38,400 bps)
Data bit	8 bits
Parity	None
Stop bit	1 bit
Flow control	None

### 6.2 Communication format

The format for sending / receiving data between the PC and the camera is as follow:

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

Details for the format:

	Details
SOF	Start of the Frame. This value is always "0x02".
Command	Command code. Please refer "Camera Control Command" for more details.
Direction	"0": Reading or receiving data from the camera is always "0". "1": Writing or sending data to the camera is always "1". Note: This value is always "0" for the response from the camera.
Data length	The data length must be specified in bytes.
Data	Set the option of writing / sending data for the commands, or receiving data from camera. The size must be specified as the "Data length".
Check sum	The check sum function to verify the integrity of the communication transmission. The check sum value should equal to the last (low) 8 bits of the summary of [Command + Direction + Data length + Data]
EOF	End of the Frame. This value is always "0x03".

## 6.3 Camera Control Commands

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

### 6.3.1 The Command List for the Communication

Command (HEX)	Command details
4A	<p>This command is for Reading data from or Writing data to the camera ICs (i.e.: EEPROM, DSP, CPU).            Use the slave addresses describe in “Slave address of the ICs (8 bits) list” to address each IC.            In the case of writing, the 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.</p> <p>[SLV]: Slave address of ICs            [START_H] x 16 + [START_L]: First address (0000 to 03FF)            [END_H] x 16 + [END_L]: Last address (0000 to 03FF)            [DATA (i)]: Data of address (i)            [DataLenH]: Upper byte of the two bytes calculated as  <math>[END\_H] \times 16 + [END\_L] - [START\_H] \times 16 + [START\_L] + 6</math>            [DataLenL]: Lower byte of the two bytes calculated as  <math>[END\_H] \times 16 + [END\_L] - [START\_H] \times 16 + [START\_L] + 6</math></p> <p>1. The format for the reading data from the ICs is as follows:            A. Sending data from the PC            02, 4A, 00, 05, [SLV], [START_H], [START_L], [END_H], [END_L], [CHK], 03</p> <p>In this example, the value of [CHK] is the last (low) 8 bits of the summary of (4A, 00, 05, [SLV], [START_H], [START_L], [END_H], [END_L])</p> <p>B. Receiving data from the camera with above sending command.            02, 4A, [DataLenH], [DataLenL], [SLV], [START_H], [START_L], [END_H], [END_L], [DATA(START)], [DATA(START+1)], ..., [DATA(END)], [CHK], 03</p> <p>In this example, the value of [CHK] is the last (low) 8 bits of the summary of (4A, [DataLenH], [DataLenL], [SLV], [START_H], [START_L], [END_H], [END_L], [DATA(START)], [DATA(START+1)], ..., [DATA(END)])</p> <p>* An example of the sending command to read out all data (address 0000 to 03FF) from the IC (Slave address of the IC is 20h) is as follows:            02, 4A, 00, 05, 20, 00, 00, 03, FF, 71, 03</p>

Command (HEX)	Command details
4A	<p>2. The format for the writing data to the ICs is as follows:</p> <p>A. Sending data from the PC            02, 4A, [DataLenH]+80, [DataLenL], [SLV], [START_H], [START_L], [END_H], [END_L], [DATA(START)], [DATA(START+1)], ..., [DATA(END)], [CHK], 03</p> <p>In this example, the value of [CHK] is the last (low) 8 bits of the summary of (4A, [DataLenH]+80, [DataLenL], [SLV], [START_H], [START_L], [END_H], [END_L], [DATA(START)], [DATA(START+1)], ..., [DATA(END)])</p> <p>B. Receiving data from the camera with above sending command.            02, 4A, [DataLenH], [DataLenL], [SLV], [START_H], [START_L], [END_H], [END_L], [DATA(START)], [DATA(START+1)], ..., [DATA(END)], [CHK], 03</p> <p>In this example, the value of [CHK] is the last (low) 8 bits of the summary of (4A, [DataLenH], [DataLenL], [SLV], [START_H], [START_L], [END_H], [END_L], [DATA(START)], [DATA(START+1)], ..., [DATA(END)])</p> <p>* An example of the sending command to write 23 to the address 0010 of the IC (Slave address of the IC is 20h) is as follows:            02, 4A, 80, 06, 20, 00, 10, 00, 23, 33, 03</p>
50	<p>This command is for the sending the OSCD (On Screen Character Display) command to the camera. 16 bytes OSCD command is the maximum amount of the data that can be written to the camera at one communication.</p> <p>In order to generate the OSCD, sets the 50h value to the command, sets the OSCD command to the data and sets the number of byte of the OSCD command to the data length.</p>

### 6.3.2 Slave address for the ICs (8 bits) list

IC	Address	Description of the IC
EEPROM	90	The EEPROM zone for the preset 0 DSP data
EEPROM	91	The EEPROM zone for the preset 1 DSP data
EEPROM	92	The EEPROM zone for the preset 2 DSP data
EEPROM	93	The EEPROM zone for the preset 3 DSP data
EEPROM	94	The EEPROM zone for the preset 4 DSP data
EEPROM	95	The EEPROM zone for the preset 5 DSP data
EEPROM	96	The EEPROM zone for the preset 6 DSP data
EEPROM	97	The EEPROM zone for the preset 7 DSP data
uCOM	30	The uCOM for the lens control and the iris control
EEPROM	40	The EEPROM zone for the uCOM data

Note: There is a maximum number to write the data to the EEPROM (1,000,000 times)

### 6.3.3 The error code list

If the communication error occurs, the camera will send the error code with the following format:  
The command number of the error message is FF (HEX). The data length is 0002.

Error	Receiving 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 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
Communication error	02, FF, 00, 02, 10, 00, 11, 03

Note.1: The camera will disregard the data that is not started with SOF.

Note.2: The time out error occurs when the camera doesn't receive the next set of the data within 3 seconds after the last received data.

## 6.4 The uCOM register mapping list

Note: DO NOT change the “Reserved” address or bit.

Address	7	6	5	4	3	2	1	0	Descriptions	Default
000						X	X	X	User preset Up to eight different DSP settings can stored. The camera starts with saved preset at the power up the camera when saving to the EEPROM. 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								X	Reserved	
						X	X		Auto focus mode 0: Normal auto focus 1: Interval auto focus 2: Zoom trigger auto focus The interval auto focus is invalid when the interval push to set auto focus is enabled.	0
					X				Interval push auto focus 0: Disable 1: Enable Push to set focus is enabled each period of time that is specified by [006h] address when the interval push to auto focus is enabled.	0
				X					Push to set iris 0: Disable 1: Enable The iris is adjusted automatically once when the push to set iris is enabled. Automatically resets to disable after the iris is adjusted.	0
			X						Iris mode 0: Fixed iris 1: Auto iris It is necessary to set the target brightness level at ALC target brightness [092h, 093h] address for the auto iris	1
		X							Push to set focus 0: Disable 1: Enable The focus is adjusted once automatically when the push to set focus is enabled. Automatically resets to disable after the focus is adjusted.	0
	X								Focus mode 0: Manual focus 1: Auto focus	1



Address	7	6	5	4	3	2	1	0	Descriptions	Default
008	X	X	X	X	X	X	X	X	Zoom position [little-endian]	12
009	0	0	0	0	X	X	X	X	12: WIDE end 1168: TELE end The zoom position moves to saved position at the power up when the value saves to the EEPROM. Zooming is stopped by the zoom position at moment when 0 is set while zooming.	
00A	X	X	X	X	X	X	X	X	Focus distance [little-endian]	101
00B	0	0	0	0	0	0	X	X	0: Infinity 898: Infinity 898: Approximately 1cm The focus distance moves to saved distance at the power up when the value saves to the EEPROM. Focusing is stopped by the focus distance at the moment when 0 is set while focusing at the manual focus.	
00C	X	X	X	X	X	X	X	X	Iris open ratio	500
00D	0	0	0	0	0	0	X	X	0: 100% close 1000: 100% open The iris is adjusting with saved open ratio at the power up when the value is saved to the EEPROM.	
00E								X	Push button 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: 115,200 bps	2
			X	X	X	X			Reserved	
		X							The return data and data length of UART write command 0: Return data includes the exact same data of write command. 1: Return data excludes data of write command, and data length is 0.	0
		X							UART check sum 0: Disable 1: Enable The camera will process the command even the check sum of the sending data does not match when the UART check sum is disabled.	1
010	X	X	X	X	X	X	X	X	Zoom lens speed The zoom lens moves fast with the greater pps setting 0: 800 pps 1: 400 pps 2: 180 pps 3: 150 pps 4: 120 pps 5: 60 pps 6: 40 pps 7: 25 pps 8: 750 pps 9: 700 pps 10: 650 pps 11: 600 pps 12: 550 pp 13: 500 pps 14: 450 pps 15 or greater: 800 pps	0
011	X	X	X	X	X	X	X	X	Manual focus speed 0: Slow speed 7: Fast speed	0

Address	7	6	5	4	3	2	1	0	Descriptions	Default
012					X	X	X	X	Minimum focus distance Sets the minimum focus distance at NEAR end 0: Infinity      1: 30 m      2: 10 m      3: 5 m 4: 3 m      5: 2m      6: 1.5 m      7: 1m 8: 50 cm      9: 30 cm      10: 10 cm      11: 1 cm 12 or greater: Prohibited 1 m is the minimum focus distance at TELE end.	7
	X	X	X	X					Reserved	
013	X	X	X	X	X	X	X	X	Dome cover correction level (%) Sets the limit expand range at NEAR end when the dome cover correction function is enabled.	100
014								X	Motion detection frame 0 0: Disable      1: Enable	1
							X		Motion detection frame 1 0: Disable      1: Enable	0
						X			Display motion detection frame 0 0: Not display      1: Display	0
					X				Display motion detection frame 1 0: Not display      1: Display	0
				X					Alarm output for Motion detection frame 0 0: Disable      1: Enable	0
			X						Alarm output for Motion detection frame 1 0: Disable      1: Enable	0
	X	X							Reserved	
015	X	X	X	X	X	X	X	X	Motion detection sensitivity threshold Sensitivity threshold = Value / 255 x 100 (%)	40
016	X	X	X	X	X	X	X	X	Motion detection interval time Set the motion detection result holding time (second)	5
017								X	Motion detect result for frame 0 (read only) 0: No detection      1: Detect	
							X		Motion detect result for frame 1 (read only) 0: No detection      1: Detect	
	X	X	X	X	X	X			Reserved	
018					X	X	X	X	User color Y	0
	X	X	X	X					Reserved	
019					X	X	X	X	User color Cr	0
	X	X	X	X					User color Cb	0
01A	X	X	X	X	X	X	X	X	Optical zoom range (WIDE end) [little-endian]	12
01B	0	0	0	0	X	X	X	X	12: WIDE end      1168: TELE end	
01C	X	X	X	X	X	X	X	X	Optical zoom range (TELE end) [little-endian]	1168
01D	0	0	0	0	X	X	X	X	12: WIDE end      1168: TELE end	
01E	X	X	X	X	X	X	X	X	Maximum voltage change for auto iris	0
01F	0	0	X	X	X	X	X	X	Set the limitation for the control voltage change derived from the auto iris step multiplier and the auto iris step divisor. When a smaller value is set, the iris control is smooth but the movement becomes slower when the brightness is changed dynamically.	





Address	7	6	5	4	3	2	1	0	Descriptions	Default
03A	X	X	X	X	X	X	X	X	Initial function for SW A Please check the available function in the push button function list.	1
03B	X	X	X	X	X	X	X	X	Initial function for SW B Please check the available function in the push button function list.	4
03C	X	X	X	X	X	X	X	X	Initial function for SW C Please check the available function in the push button function list.	5
03D	X	X	X	X	X	X	X	X	Initial function for SW D Please check the available function in the push button function list.	2
03E	X	X	X	X	X	X	X	X	Initial function for SW E Please check the available function in the push button function list.	3
03F to 04F	X	X	X	X	X	X	X	X		
050						X	X	X	Menu color for OSCD 0: Black      1: Blue      2: Green      3: Cyan 4: Red      5: Magenta      6: Yellow      7: White	7
					X				Character size for OSCD 0: Large      1: Small	0
	X	X	X	X					Reserved	
051	X	X	X	X	X	X	X	X	OSCD horizontal display position 0: Left      255: Right	0
052	X	X	X	X	X	X	X	X	OSCD vertical display position 0: Top      255: Bottom	0
053	X	X	X	X	X	X	X	X	OSCD automatically disable time	0
054	X	X	X	X	X	X	X	X	Set the time to disable the OSCD from the last OSCD operation (second). This is valid only for the camera internal OSCD.	
055								X	Reserved	
						X	X		Test pattern 0: Disable (Video output)      1: Horizontal color bar 2: Ramp      3: Vertical color bar	0
	X	X	X	X	X				Reserved	
056							0	0	Reserved	0
						X			OSD menu ON / OFF	
					X				OSD menu Up	
				X					OSD menu Down	
			X						OSD menu Left	
		X							OSD menu Right	
	0								Reserved	
057 to 058	X	X	X	X	X	X	X	X	Reserved	
059					X	X	X	X	Number of frames skipped for auto iris control Set the number of the frame that is skipped for the auto iris control.	3
	X	X	X	X					Reserved	
05A to 06F	X	X	X	X	X	X	X	X	Reserved	

Address	7	6	5	4	3	2	1	0	Descriptions	Default
070	X	X	X	X	X	X	X	X	The priority auto focus detection frame number Select the priority frame for the auto focus function 0, 136 or greater: Fixed center, size and position 1 to 135: select priority frame from 135 frame (15 horizontal x 9 vertical)	0
071 to 073	X	X	X	X	X	X	X	X	Reserved	
074	X	X	X	X	X	X	X	X	Vertical size (height) for the priority auto focus detection frame	720
075	0	0	0	0	0	X	X	X	This size is valid for the 1 to 135 priority detection frames	
076	X	X	X	X	X	X	X	X	Horizontal size (width) for the priority auto focus detection frame	1024
077									This size is valid for the 1 to 135 priority detection frames	
078 to 080	X	X	X	X	X	X	X	X	Reserved	
081	X	X	X	X	X	X	X	X	VISCA address to recover Sentech protocol	15
082	X	X	X	X	X	X	X	X	Pelco D camera address	0
083	X	X	X	X	X	X	X	X	Pelco D command to recover Sentech protocol	129
084 to 1DF	X	X	X	X	X	X	X	X	Reserved	
1E0	X	X	X	X	X	X	X	X	Height for Motion detection frame 0	1080
1E1	0	0	0	0	0	X	X	X		
1E2	X	X	X	X	X	X	X	X	Vertical position for Motion detection frame 0	0
1E3	0	0	0	0	0	X	X	X	(Complement on two)	
1E4	X	X	X	X	X	X	X	X	Width for Motion detection frame 0	1920
1E5	0	0	0	0	0	X	X	X		
1E6	X	X	X	X	X	X	X	X	Horizontal position for Motion detection frame 0	0
1E7	0	0	0	0	0	X	X	X	(Complement on two)	
1E8	X	X	X	X	X	X	X	X	Height for Motion detection frame 1	1080
1E9	0	0	0	0	0	X	X	X		
1EA	X	X	X	X	X	X	X	X	Vertical position for Motion detection frame 1	0
1EB	0	0	0	0	0	X	X	X	(Complement on two)	
1EC	X	X	X	X	X	X	X	X	Width for Motion detection frame 1	1920
1ED	0	0	0	0	0	X	X	X		
1EE	X	X	X	X	X	X	X	X	Horizontal position for Motion detection frame 1	0
1EF	0	0	0	0	0	X	X	X	(Complement on two)	
1F0 to 37F	X	X	X	X	X	X	X	X	Reserved	
380	X	X	X	X	X	X	X	X	Firmware version (read only)	
381	0	0	0	0	0	0	X	X		
382 to 387	X	X	X	X	X	X	X	X	Reserved	
388	X	X	X	X	X	X	X	X	Temperature sensor data output (read only)	
389 to 3FF	X	X	X	X	X	X	X	X	Reserved	

## AF AOI (Area Of Interest)

The priority auto focus frame number is assigned as below.

The focus is adjusted following the priority of the object in the priority auto focus detection frame.

If the auto focus target object is not in the selected priority auto focus detection frame, the focus will adjusted to the first object that is in focus in the full screen.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135

## Zoom table

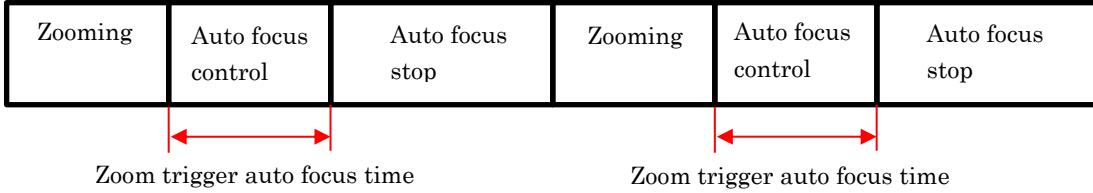
Zoom position	Magnification	Zoom position	Magnification
12	1.0	750	4.5
100	1.1	800	5.2
150	1.2	850	6.0
200	1.4	900	7.1
250	1.5	950	8.4
300	1.6	1000	10
350	1.8	1050	12
354	1.8	1100	14
400	2.0	1120	15
450	2.2	1130	16
500	2.4	1140	17
550	2.7	1150	18
600	3.0	1160	19
650	3.4	1168	20
700	3.9		

## Focus table

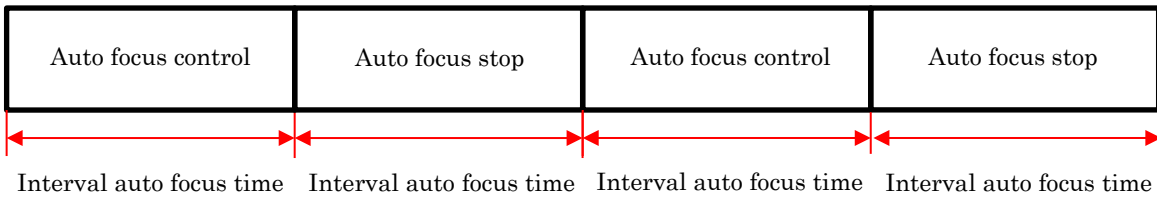
Focus distance	Setting	Focus distance	Setting
Infinity	101	Dead zone	604 to 638
30 m	125	50 cm	656
10 m	169	30 cm	677
5 m	231	10 cm	746
3 m	306	1 cm	898
2 m	390		
1.5 m	467		
1 m	603		

Zoom trigger auto focus and interval auto focus operation

Zoom trigger auto focus: Auto focus control for specified time after zooming



Interval auto focus: Auto focus control and stop repeatedly with the specified interval time



Note: The interval auto focus function is disabled automatically when the interval push to set auto focus is enabled.

Temperature sensor data table

Temperature sensor data (Hex)	Temperature (deg. C)
7F	128
7F	127
64	100
50	80
4B	75
32	50
19	25
0	0
FF	-1
EF	-25
C9	-55

## 6.4.1 Push button functions for the display menu

The initial function assignment for each switch for the display menu is follows:

	Menu is displayed	Menu is OFF
SW A: Menu	Open / close menu	
SW B: Up	Cursor moves to up / increase value	Focus to NEAR
SW C: Down	Cursor moves to down / decrease value	Focus to FAR
SW D: Left	Cursor moves to left	Zoom to WIDE
SW E: Right	Cursor moves to right	Zoom to TELE

## 6.4.2 Push button function list

Value	Function	Descriptions
0x00	Disable	Key functions are disabled.
0x01	Display menu	Display the menu.
0x02	Zoom to WIDE	Zoom position moves to the WIDE.
0x03	Zoom to TELE	Zoom position moves to the TELE.
0x04	Focus to NEAR	Focus distance moves to the NEAR.
0x05	Focus to FAR	Focus distance moves to the FAR.

## 6.5 DSP register mapping list

Address	7	6	5	4	3	2	1	0	Descriptions	Default
001 to 015	X	X	X	X	X	X	X	X	Reserved	
016	X	X	X	X	X	X	X	X	Exposure time [little-endian]	100
017	X	X	X	X	X	X	X	X	Set the exposure time for the manual shutter control. Value range for 60fps is 1 to 166, for 50fps is 1 to 199, for 30fps is 1 to 331 Exposure time (second) = Value / 10,000	
018	X	X	X	X	X	X	X	X	Gain [little-endian]	0
019	X	X	X	X	X	X	X	X	Set the gain for the manual gain Gain (dB) = Value x 0.3 + 1.2	
01A to 02F	X	X	X	X	X	X	X	X	Reserved	
02C to 02D	X	X	X	X	X	X	X	X	Gamma offset	
02E to 02F	X	X	X	X	X	X	X	X	Reserved	
030					X	X	X	X	White balance mode 0: Auto 1: Full open 2: AWB hold 3: Custom color temperature 4: USER mode	0
				X					Indoor / outdoor mode 0: Indoor mode 1: Outdoor mode	0
		X	X						Reserved	
	X								Push lock white balance Switch to AWB hold after push lock white balance selected. 0: Disable 1: Enable	0
031	X	X	X	X	X	X	X	X	Auto white balance start tolerance Set the number of the frame that is the outside of the dead zone continuously, to start the auto white balance function.	8
032	X	X	X	X	X	X	X	X	Auto white balance process speed Set the white balance process speed (number of the frame()) This is valid for the auto white balance or the full open.	1
033	X	X	X	X	X	X	X	X	Auto white balance convergence step for near target The auto white balance process speed is faster when setting the smaller steps.	12
034	X	X	X	X	X	X	X	X	Auto white balance convergence step for far target The auto white balance process speed is faster when setting the smaller steps.	12
035	X	X	X	X	X	X	X	X	Full open convergence step The auto white balance process speed is faster when smaller steps are set.	2
036	X	X	X	X	X	X	X	X	Red gain for USER mode	4565
037	X	X	X	X	X	X	X	X	This is only valid for the USER mode.	
038	X	X	X	X	X	X	X	X	Blue gain for USER mode	4191
039	X	X	X	X	X	X	X	X	This is only valid for the USER mode.	
03A	X	X	X	X	X	X	X	X	Custom color temperature	39

03B	X	X	X	X	X	X	X	X	Reserved	
03C to 03D	X	X	X	X	X	X	X	X	AWB offset R/G Available on Auto mode	
03E to 03F	X	X	X	X	X	X	X	X	AWB offset B/G Available on Auto mode	

Descriptions for the white balance mode

• Auto (Auto Trace White balance)

The white balance is adjusted automatically based on the pull-in frame and the pull-in limit frame when the color temperature is changed.

The auto white balance tolerance, speed and the convergence step are adjustable.

Indoor / outdoor mode

Set the pull-in frame for the auto white balance. The pull-in frame is expanded when indoor mode is selected.

• Full open

The white balance is adjusted regardless of the object condition.

This function is not dependent on the pull-in frame. The color of the extensive area is pull-in the white.

• Auto white balance hold

The white balance is hold with the white balance gain when the Auto white balance hold is selected.

Push lock function

When the white balance mode is changed from the full open to the auto white balance hold, the white balance gain is saved to the EEPROM.

When the camera starts with the auto white balance hold mode, the white balance gain in the EEPROM is used in the white balance control and the white balance function is hold.

When “Push Lock” button in the software is selected, the white balance mode is changed from the full open to the auto white balance hold and then it is saved to the EEPROM automatically.

• Custom color temperature mode

Set the white balance as the target color temperature manually.

Value [h]	Color temperature	Value [h]	Color temperature	Value [h]	Color temperature
00	1,500	18	2,227	30	4,324
03	1,564	1B	2,371	33	4,900
06	1,633	1E	2,534	36	5,654
09	1,709	21	2,722	39	6,682
0C	1,793	24	2,940	3C	8,167
0F	1,885	27	3,196	3F	10,500
12	1,986	2A	3,500		
15	2,100	2D	3,868		

• USER mode

The white balance sets to manual.

Please set the white balance manually with USER R/G (036h to 037h) and USER B/G (038h to 039h).



Address	7	6	5	4	3	2	1	0	Descriptions	Default
040	0	0	0	0	X	X	X	X	Resolution / Frame rate 0: 1080p 60fps 3: 1080p 50fps 6: 720p 60fps 10: 1080p 59.94fps 13: 720p 59.94fps 1: 1080p 30fps 4: 1080p 25fps 7: 720p 50fps 11: 1080p 29.97fps	0
041							X	X	Mirror image 0: Normal image 2: Vertical mirror 1: Horizontal mirror 3: Horizontal and vertical mirror	0
	X	X	X	X	X	X			Reserved	
042	X	X	X	X	X	X	X	X	Reserved	

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 for the image 0: Gamma apply      1: Not apply	0
	X	X	X						Reserved	
044	X	X	X	X	X	X	X	X	Manual gamma control point 00 [little-endian]	408
045	0	0	0	0	X	X	X	X		
046	X	X	X	X	X	X	X	X	Manual gamma control point 01 [little-endian]	432
047	0	0	0	0	X	X	X	X		
048	X	X	X	X	X	X	X	X	Manual gamma control point 02 [little-endian]	464
049	0	0	0	0	X	X	X	X		
04A	X	X	X	X	X	X	X	X	Manual gamma control point 03 [little-endian]	496
04B	0	0	0	0	X	X	X	X		
04C	X	X	X	X	X	X	X	X	Manual gamma control point 04 [little-endian]	544
04D	0	0	0	0	X	X	X	X		
04E	X	X	X	X	X	X	X	X	Manual gamma control point 05 [little-endian]	592
04F	0	0	0	0	X	X	X	X		
050	X	X	X	X	X	X	X	X	Manual gamma control point 06 [little-endian]	640
051	0	0	0	0	X	X	X	X		
052	X	X	X	X	X	X	X	X	Manual gamma control point 07 [little-endian]	688
053	0	0	0	0	X	X	X	X		
054	X	X	X	X	X	X	X	X	Manual gamma control point 08 [little-endian]	736
055	0	0	0	0	X	X	X	X		
056	X	X	X	X	X	X	X	X	Manual gamma control point 09 [little-endian]	768
057	0	0	0	0	X	X	X	X		
058	X	X	X	X	X	X	X	X	Manual gamma control point 10 [little-endian]	0
059	0	0	0	0	X	X	X	X		
05A	X	X	X	X	X	X	X	X	Manual gamma control point 11 [little-endian]	636
05B	0	0	0	0	X	X	X	X		
05C	X	X	X	X	X	X	X	X	Manual gamma control point 12 [little-endian]	869
05D	0	0	0	0	X	X	X	X		
05E	X	X	X	X	X	X	X	X	Manual gamma control point 13 [little-endian]	992
05F	0	0	0	0	X	X	X	X		
060	X	X	X	X	X	X	X	X	Manual gamma control point 14 [little-endian]	1088
061	0	0	0	0	X	X	X	X		
062	X	X	X	X	X	X	X	X	Manual gamma control point 15 [little-endian]	1168
063	0	0	0	0	X	X	X	X		
064	X	X	X	X	X	X	X	X	Manual gamma control point 16 [little-endian]	1240
065	0	0	0	0	X	X	X	X		
066	X	X	X	X	X	X	X	X	Manual gamma control point 17 [little-endian]	1300
067	0	0	0	0	X	X	X	X		
068	X	X	X	X	X	X	X	X	Manual gamma control point 18 [little-endian]	1320
069	0	0	0	0	X	X	X	X		
06A	X	X	X	X	X	X	X	X	Manual gamma control point 19 [little-endian]	1332
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 control point 20 [little-endian]	1348
06D	0	0	0	0	X	X	X	X		
06E	X	X	X	X	X	X	X	X	Manual gamma control point 21 [little-endian]	1360
06F	0	0	0	0	X	X	X	X		
070	X	X	X	X	X	X	X	X	Manual gamma control point 22 [little-endian]	1372
071	0	0	0	0	X	X	X	X		
072	X	X	X	X	X	X	X	X	Manual gamma control point 23 [little-endian]	1388
073	0	0	0	0	X	X	X	X		
074	X	X	X	X	X	X	X	X	Manual gamma control point 24 [little-endian]	1404
075	0	0	0	0	X	X	X	X		
076	X	X	X	X	X	X	X	X	Manual gamma control point 25 [little-endian]	1420
077	0	0	0	0	X	X	X	X		
078	X	X	X	X	X	X	X	X	Manual gamma control point 26 [little-endian]	1436
079	0	0	0	0	X	X	X	X		
07A	X	X	X	X	X	X	X	X	Manual gamma control point 27 [little-endian]	1452
07B	X	X	X	X	X	X	X	X		
07C	X	X	X	X	X	X	X	X	Color hue adjustment (Compliment on two)	0
07D	X	X	X	X	X	X	X	X	Color saturation adjustment	100
07E	X	X	X	X	X	X	X	X	Sharpness gain	64
07F								X	ART-EX (Wide dynamic range) function 0: Disable    1: Enable	0
								X	Defog function 0: Disable    1: Enable	0
						X			Negative / Positive function 0: Disable    1: Enable	0
					X				Shading function 0: Enable     1: Disable	0
	X	X	X	X						Reserved
080								X	Photometry mode 0: Average     1: Emphasis 2: Spot     3: Backlight	0
	X	X	X	X	X	X	X		Reserved	
081	X	X	X	X	X	X	X	X	Weight for frame 0 (Only valid for Emphasis photometry)	9
082	X	X	X	X	X	X	X	X	Weight for frame 1 (Only valid for Emphasis photometry)	15
083	X	X	X	X	X	X	X	X	Weight for frame 2 (Only valid for Emphasis photometry)	9
084	X	X	X	X	X	X	X	X	Weight for frame 3 (Only valid for Emphasis photometry)	18
085	X	X	X	X	X	X	X	X	Weight for frame 4 (Only valid for Emphasis photometry)	72
086	X	X	X	X	X	X	X	X	Weight for frame 5 (Only valid for Emphasis photometry)	18
087	X	X	X	X	X	X	X	X	Weight for frame 6 (Only valid for Emphasis photometry)	12
088	X	X	X	X	X	X	X	X	Weight for frame 7 (Only valid for Emphasis photometry)	30
089	X	X	X	X	X	X	X	X	Weight for frame 8 (Only valid for Emphasis photometry)	12
08A	X	X	X	X	X	X	X	X	Photometry frame for spot photometry mode	31
08B	X	X	X	X	X	X	X	X	Weight of outside frame for the spot photometry mode	32
08C								X	Mute 0: Disable     1: Enable	0
	X	X	X	X	X	X	X		Reserved	
08D to	X	X	X	X	X	X	X	X	Reserved	

08F									
-----	--	--	--	--	--	--	--	--	--

- Gamma mode  
Please select 1: 0.45, 2: 0.6, 3: 0.8, or 4: 1.0 for the preset gamma.  
Please select 0: Manual and set the gamma control points for the manual gamma.
- Photometry mode  
The brightness level is adjusted by adjusting the gain and the exposure time based on the weight for the image automatically.

Average photometry mode: The same weight for all frames  
 Emphasis photometry mode: The weight is set for nine frames  
 Spot photometry mode: The weight is set for specified spot frame and the surrounding frame.

0	1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35
36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53
54	55	56	57	58	59	60	61	62

Backlight compensate mod: Backlight compensate mode.

Address	7	6	5	4	3	2	1	0	Descriptions	Default
090			X	X	X	X	X	X	Reserved	
		X							Exposure control 0: Fixed shutter                      1: AEE (Auto shutter)	0
	X								Gain control 0: Fixed gain control                      1: AGC (Auto gain control)	1
091							X	X	Reserved	
						X			IR cut filter ON / OFF auto control IR cut filter on / off control automatically based on the IRC disable gain. 0: Disable                                  1: Enable	0
					X				Image switch to the monochrome when IR cut filter off 0: Disable                                  1: Enable	0
				X					Reserved	
		X	X						IR light wavelength 0: Standard    1: 850 nm    2: 940 nm    3: N/A	0
	X								IR cut filter manual control This is valid when IR cut filter on / off auto control is disabled. 0: ON    1: OFF	0
092	X	X	X	X	X	X	X	X	Target brightness for ALC [little-endian]	200
093	0	0	0	0	0	X	X	X		
094 to 097	X	X	X	X	X	X	X	X	Reserved	
098	0	0	X	X	X	X	X	X	ALC average integration frames Calculates the average brightness with this frame for ALC control. 0: 1 frame (No average)                  1: 2 frames 2: 4 frames                                  3: 8 frames 4: 16 frames                                  5: 32 frames 6: 64 frames                                  7: 128 frames 8: 256 frames                                  9: 512 frames 10: 1,024 frames 11 or greater: Please check the ALC average integration frame table	1
009 to 0A1	X	X	X	X	X	X	X	X	Reserved	
0A2	X	X	X	X	X	X	X	X	AEE minimum exposure time Value rage for 60fps is 1 to 166, for 50fps is 1 to 199, for 30fps is 1 to 331 Exposure time (second) = Value / 10,000	1
0A3	0	0	0	0	0	X	X	X		
0A4	X	X	X	X	X	X	X	X	AEE maximum exposure time Value rage for 60fps is 1 to 166, for 50fps is 1 to 199, for 30fps is 1 to 331 Exposure time (second) = Value / 10,000	166
0A5	0	0	0	0	0	X	X	X		
0A6 to 0A9	X	X	X	X	X	X	X	X	Reserved	

Address	7	6	5	4	3	2	1	0	Descriptions	Default
0AA	X	X	X	X	X	X	X	X	AEE tolerance The AEE control is stopped when "Target brightness - current brightness" is smaller than Target brightness x value.	3
0AB	X	X	X	X	X	X	X	X	AEE Threshold The AEE control is started when "Target brightness - current brightness" is greater than Target brightness x (AEE tolerance + value).	3
0AC	X	X	X	X	X	X	X	X	AEE speed Set the AEE control speed, which is the maximum exposure time change at one step. No limitation exposure time when 0 is set.	150
0AD to 0BF	X	X	X	X	X	X	X	X	Reserved	

Address	7	6	5	4	3	2	1	0	Descriptions	Default
0C0 to 0C1	X	X	X	X	X	X	X	X	Reserved	
0C2	X	X	X	X	X	X	X	X	AGC minimum gain [little-endian]	0
0C3	0	0	0	0	0	0	0	Value range is 0 to 150. Gain (dB) = Value x 0.3 + 1.2		
0C4 to 0C5	X	X	X	X	X	X	X	X	Reserved	
0C6	X	X	X	X	X	X	X	X	AGC maximum gain [little-endian]	97
0C7	0	0	0	0	0	0	0	Value range is 0 to 150. Gain (dB) = Value x 0.3 + 1.2		
0C8	X	X	X	X	X	X	X	X	AGC tolerance The AGC control is stopped when "Target brightness - current brightness" is smaller than "Target brightness" x value.	3
0C9	X	X	X	X	X	X	X	X	AGC threshold The AGC control is started when "Target brightness - current brightness" is greater than Target brightness x (AGC tolerance + value).	3
0CA	X	X	X	X	X	X	X	X	AGC speed Set the AGC control speed, which is the maximum gain change at one step. No limitation gain when 0 is set.	20
0CB	X	X	X	X	X	X	X	X	AGC step multiplier Adjust the voltage change for the AGC control Voltage change = (Target brightness - current brightness) x (AGC step multiplier + 1) / (AGC step divisor + 1)	0
0CC	X	X	X	X	X	X	X	X	AGC step divisor Adjust the voltage change for the AGC control Voltage change = (Target brightness - current brightness) x (AGC step multiplier + 1) / (AGC step divisor + 1)	1
0CD to 0D3	X	X	X	X	X	X	X	X	Reserved	
0D4	X	X	X	X	X	X	X	X	IR cut filter disable gain	60
0D5	0	0	0	0	0	0	0	Value range is 0 to 150. Gain (dB) = Value x 0.3 + 1.2		
0D6	X	X	X	X	X	X	X	X	IR cut filter enable gain	30
0D7	0	0	0	0	0	0	0	Value range is 0 to 150. Gain (dB) = Value x 0.3 + 1.2		
0D8 to 0Df	X	X	X	X	X	X	X	X	Reserved	



Descriptions for ALC control

AEE, AGC and the auto iris are linked as follows:

Object		Exposure time	Iris	Gain
Bright		Minimum	Minimum open ratio	Minimum
		Fluctuation		
		Maximum	Fluctuation	Fluctuation
			Maximum open ratio	
				Maximum
Dark				

Note: It is possible that the camera CANNOT perform auto focus with the noisy image with the high gain is set. Please reduce the gain or the focus adjusts manually.

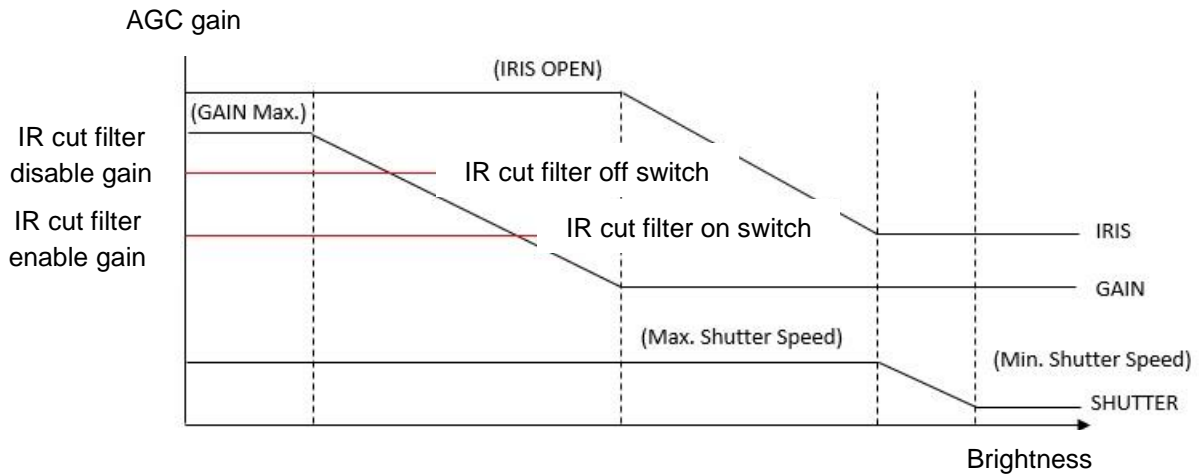
ALC average integration frames

When the longer average integration frames is set, ALC response slowly for the dynamic brightness change.

Value	Frames	Value	Frames	Value	Frames	Value	Frames	Value	Frames
0	1	10	1,024	20	9,131	30	17,571	40	26,011
1	2	11	1,535	21	9,975	31	18,415	41	26,855
2	4	12	2,379	22	10,819	32	19,259	42	27,699
3	8	13	3,223	23	11,663	33	20,103	43	28,543
4	16	14	4,067	24	12,507	34	20,947	44	29,387
5	32	15	4,911	25	13,351	35	21,791	45	30,231
6	64	16	5,755	26	14,195	36	22,635	46	31,075
7	128	17	6,599	27	15,039	37	23,479	47	31,919
8	256	18	7,443	28	15,883	38	24,323	48	32,763
9	512	19	8,287	29	16,727	39	25,167	49 or greater	1

## Descriptions for Auto IR cut filter control

The auto IR cut filter control function is operated as follow:



IR cut filter is off automatically when the gain is greater than the IR cut filter disable gain.

IR cut filter is on automatically when the gain is smaller than the IR cut filter enable gain.

It is necessary to set the IR cut filter disable gain and the IR cut filter enable gain with enough tolerance to avoid chattering.

## IR light wavelength

It is necessary to change the IR light wavelength for [091h. bit5, 6] if the IR light is used when the IR cut filter is OFF. The out of focus issue due to the IR light influence is corrected.

Address	7	6	5	4	3	2	1	0	Descriptions	Default
0E0	X	X	X	X	X	X	X	X	Size shift for Privacy mask 0 (complement on two)	0
0E1	X	X	X	X	X	X	X	X	Size shift for Privacy mask 1 (complement on two)	0
0E2	X	X	X	X	X	X	X	X	Size shift for Privacy mask 2 (complement on two)	0
0E3	X	X	X	X	X	X	X	X	Size shift for Privacy mask 3 (complement on two)	0
0E4	X	X	X	X	X	X	X	X	Size shift for Privacy mask 4 (complement on two)	0
0E5	X	X	X	X	X	X	X	X	Size shift for Privacy mask 5 (complement on two)	0
0E6	X	X	X	X	X	X	X	X	Size shift for Privacy mask 6 (complement on two)	0
0E7	X	X	X	X	X	X	X	X	Size shift for Privacy mask 7 (complement on two)	0
0E8 to 0F0	X	X	X	X	X	X	X	X	Reserved	
0F1			X	X	X	X	X	X	Vertical mosaic size for Privacy mask	32
	X	X							Reserved	
0F2			X	X	X	X	X	X	Horizontal mosaic size for Privacy mask	32
	X	X							Reserved	
0F3 to 0F8	X	X	X	X	X	X	X	X	Reserved	
0F9	X	X	X	X	X	X	X	X	User setting for noise reduction	0
0FA	X	X	X	X	X	X	X	X	Local correlation noise reduction level	0
0FB						X	X	X	Noise reduction level 0: Low 5: High	0
					X				Reserved	
		X	X	X					Horizontal Low Path Filter 0: Low 4: High	0
	X								Reserved	
0FC	X	X	X	X	X	X	X	X	Horizontal aperture level	0
0FD	X	X	X	X	X	X	X	X	Vertical aperture level	0
0FE to 0FF	X	X	X	X	X	X	X	X	Reserved	



Address	7	6	5	4	3	2	1	0	Descriptions	Default
128										
129	X	X	X	X	X	X	X	X	Contrast Set the gain for the output signal. Contrast = Value / 128	128
12A		X	X	X	X	X	X	X	Reserved	
	X								Color image / monochrome image 0: Color image    1: Monochrome image	0
12B to 12C	X	X	X	X	X	X	X	X	Reserved	
12D	X	X	X	X	X	X	X	X	Brightness	0
12E to 12F	X	X	X	X	X	X	X	X	Reserved	0
130								X	Privacy mask 0 0: Disable    1: Enable	0
							X		Privacy mask 0 mosaic display 0: Disable    1: Enable	0
			X	X	X	X			Privacy mask 0 color Please check the color code list.	8
		X							Privacy mask 0 transparency 0: No transparency    1: Transparency	0
	X								Privacy mask 0 linked zoom function 0: Enable    1: Disable	0
131								X	Privacy mask 1 0: Disable    1: Enable	0
							X		Privacy mask 1 mosaic display 0: Disable    1: Enable	0
			X	X	X	X			Privacy mask 1 color Please check the color code list.	8
		X							Privacy mask 1 transparency 0: No transparency    1: Transparency	0
	X								Privacy mask 1 linked zoom function 0: Enable    1: Disable	0
132								X	Privacy mask 2 0: Disable    1: Enable	0
							X		Privacy mask 2 mosaic display 0: Disable    1: Enable	0
			X	X	X	X			Privacy mask 2 color Please check the color code list.	8
		X							Privacy mask 2 transparency 0: No transparency    1: Transparency	0
	X								Privacy mask 2 linked zoom function 0: Enable    1: Disable	0

Address	7	6	5	4	3	2	1	0	Descriptions	Default
133								X	Privacy mask 3 0: Disable 1: Enable	0
							X		Privacy mask 3 mosaic display 0: Disable 1: Enable	0
			X	X	X	X			Privacy mask 3 color Please check the color code list.	8
		X							Privacy mask 3 transparency 0: No transparency 1: Transparency	0
	X								Privacy mask 3 linked zoom function 0: Enable 1: Disable	0
134								X	Privacy mask 4 0: Disable 1: Enable	0
							X		Privacy mask 4 mosaic display 0: Disable 1: Enable	0
			X	X	X	X			Privacy mask 4 color Please check the color code list.	8
		X							Privacy mask 4 transparency 0: No transparency 1: Transparency	0
	X								Privacy mask 4 linked zoom function 0: Enable 1: Disable	0
135								X	Privacy mask 5 0: Disable 1: Enable	0
							X		Privacy mask 5 mosaic display 0: Disable 1: Enable	0
			X	X	X	X			Privacy mask 5 color Please check the color code list.	8
		X							Privacy mask 5 transparency 0: No transparency 1: Transparency	0
	X								Privacy mask 5 linked zoom function 0: Enable 1: Disable	0
136								X	Privacy mask 6 0: Disable 1: Enable	0
							X		Privacy mask 6 mosaic display 0: Disable 1: Enable	0
			X	X	X	X			Privacy mask 6 color Please check the color code list.	8
		X							Privacy mask 6 transparency 0: No transparency 1: Transparency	0
	X								Privacy mask 6 linked zoom function 0: Enable 1: Disable	0

Address	7	6	5	4	3	2	1	0	Descriptions	Default
137								X	Privacy mask 7 0: Disable 1: Enable	0
							X		Privacy mask 7 mosaic display 0: Disable 1: Enable	0
			X	X	X	X			Privacy mask 7 color Please check the color code list.	8
		X							Privacy mask 7 transparency 0: No transparency 1: Transparency	0
	X								Privacy mask 7 linked zoom function 0: Enable 1: Disable	0
138 to 13F	X	X	X	X	X	X	X	X	Reserved	0
140	X	X	X	X	X	X	X	X	Privacy mask 0 width [little-endian]	20
141	0	0	0	0	0	X	X	X		
142	X	X	X	X	X	X	X	X	Privacy mask 0 horizontal position [little-endian] (complement on two)	-75
143	0	0	0	0	0	X	X	X		
144	X	X	X	X	X	X	X	X	Privacy mask 0 height [little-endian]	20
145	0	0	0	0	0	X	X	X		
146	X	X	X	X	X	X	X	X	Privacy mask 0 vertical position [little-endian] (complement on two)	-30
147	0	0	0	0	0	X	X	X		
148	X	X	X	X	X	X	X	X	Privacy mask 1 width [little-endian]	20
149	0	0	0	0	0	X	X	X		
14A	X	X	X	X	X	X	X	X	Privacy mask 1 horizontal position [little-endian] (complement on two)	-25
14B	0	0	0	0	0	X	X	X		
14C	X	X	X	X	X	X	X	X	Privacy mask 1 height [little-endian]	20
14D	0	0	0	0	0	X	X	X		
14E	X	X	X	X	X	X	X	X	Privacy mask 1 vertical position [little-endian] (complement on two)	-30
14F	0	0	0	0	0	X	X	X		
150	X	X	X	X	X	X	X	X	Privacy mask 2 width [little-endian]	20
151	0	0	0	0	0	X	X	X		
152	X	X	X	X	X	X	X	X	Privacy mask 2 horizontal position [little-endian] (complement on two)	25
153	0	0	0	0	0	X	X	X		
154	X	X	X	X	X	X	X	X	Privacy mask 2 height [little-endian]	20
155	0	0	0	0	0	X	X	X		
156	X	X	X	X	X	X	X	X	Privacy mask 2 vertical position [little-endian] (complement on two)	-30
157	0	0	0	0	0	X	X	X		
158	X	X	X	X	X	X	X	X	Privacy mask 3 width [little-endian]	20
159	0	0	0	0	0	X	X	X		
15A	X	X	X	X	X	X	X	X	Privacy mask 3 horizontal position [little-endian] (complement on two)	75
15B	0	0	0	0	0	X	X	X		
15C	X	X	X	X	X	X	X	X	Privacy mask 3 height [little-endian]	20
15D	0	0	0	0	0	X	X	X		
15E	X	X	X	X	X	X	X	X	Privacy mask 3 vertical position [little-endian] (complement on two)	-30
15F	0	0	0	0	0	X	X	X		

Address	7	6	5	4	3	2	1	0	Descriptions	Default
160	X	X	X	X	X	X	X	X	Privacy mask 4 width [little-endian]	20
161	0	0	0	0	0	X	X	X		
162	X	X	X	X	X	X	X	X	Privacy mask 4 horizontal position [little-endian] (complement on two)	-75
163	0	0	0	0	0	X	X	X		
164	X	X	X	X	X	X	X	X	Privacy mask 4 height [little-endian]	20
165	0	0	0	0	0	X	X	X		
166	X	X	X	X	X	X	X	X	Privacy mask 4 vertical position [little-endian] (complement on two)	30
167	0	0	0	0	0	X	X	X		
168	X	X	X	X	X	X	X	X	Privacy mask 5 width [little-endian]	20
169	0	0	0	0	0	X	X	X		
16A	X	X	X	X	X	X	X	X	Privacy mask 5 horizontal position [little-endian] (complement on two)	-25
16B	0	0	0	0	0	X	X	X		
16C	X	X	X	X	X	X	X	X	Privacy mask 5 height [little-endian]	20
16D	0	0	0	0	0	X	X	X		
16E	X	X	X	X	X	X	X	X	Privacy mask 5 vertical position [little-endian] (complement on two)	30
16F	0	0	0	0	0	X	X	X		
170	X	X	X	X	X	X	X	X	Privacy mask 6 width [little-endian]	20
171	0	0	0	0	0	X	X	X		
172	X	X	X	X	X	X	X	X	Privacy mask 6 horizontal position [little-endian] (complement on two)	25
173	0	0	0	0	0	X	X	X		
174	X	X	X	X	X	X	X	X	Privacy mask 6 height [little-endian]	20
175	0	0	0	0	0	X	X	X		
176	X	X	X	X	X	X	X	X	Privacy mask 6 vertical position [little-endian] (complement on two)	30
177	0	0	0	0	0	X	X	X		
178	X	X	X	X	X	X	X	X	Privacy mask 7 width [little-endian]	20
179	0	0	0	0	0	X	X	X		
17A	X	X	X	X	X	X	X	X	Privacy mask 7 horizontal position [little-endian] (complement on two)	75
17B	0	0	0	0	0	X	X	X		
17C	X	X	X	X	X	X	X	X	Privacy mask 7 height [little-endian]	20
17D	0	0	0	0	0	X	X	X		
17E	X	X	X	X	X	X	X	X	Privacy mask 7 vertical position [little-endian] (complement on two)	30
17F	0	0	0	0	0	X	X	X		
180 to 1BF	X	X	X	X	X	X	X	X	Reserved	



Address	7	6	5	4	3	2	1	0	Descriptions	Default
1C0	X	X	X	X	X	X	X	X	Privacy mask 0 horizontal position shift [little-endian] (compliment on two)	20
1C1	0	0	0	0	0	X	X	X		
1C2	X	X	X	X	X	X	X	X	Privacy mask 0 vertical position shift [little-endian] (compliment on two)	20
1C3	0	0	0	0	0	X	X	X		
1C4	X	X	X	X	X	X	X	X	Privacy mask 1 horizontal position shift [little-endian] (compliment on two)	20
1C5	0	0	0	0	0	X	X	X		
1C6	X	X	X	X	X	X	X	X	Privacy mask 1 vertical position shift [little-endian] (compliment on two)	20
1C7	0	0	0	0	0	X	X	X		
1C8	X	X	X	X	X	X	X	X	Privacy mask 2 horizontal position shift [little-endian] (compliment on two)	20
1C9	0	0	0	0	0	X	X	X		
1CA	X	X	X	X	X	X	X	X	Privacy mask 2 vertical position shift [little-endian] (compliment on two)	20
1CB	0	0	0	0	0	X	X	X		
1CC	X	X	X	X	X	X	X	X	Privacy mask 3 horizontal position shift [little-endian] (compliment on two)	20
1CD	0	0	0	0	0	X	X	X		
1CE	X	X	X	X	X	X	X	X	Privacy mask 3 vertical position shift [little-endian] (compliment on two)	20
1CF	0	0	0	0	0	X	X	X		
1D0	X	X	X	X	X	X	X	X	Privacy mask 4 horizontal position shift [little-endian] (compliment on two)	20
1D1	0	0	0	0	0	X	X	X		
1D2	X	X	X	X	X	X	X	X	Privacy mask 4 vertical position shift [little-endian] (compliment on two)	20
1D3	0	0	0	0	0	X	X	X		
1D4	X	X	X	X	X	X	X	X	Privacy mask 5 horizontal position shift [little-endian] (compliment on two)	20
1D5	0	0	0	0	0	X	X	X		
1D6	X	X	X	X	X	X	X	X	Privacy mask 5 vertical position shift [little-endian] (compliment on two)	20
1D7	0	0	0	0	0	X	X	X		
1D8	X	X	X	X	X	X	X	X	Privacy mask 6 horizontal position shift [little-endian] (compliment on two)	20
1D9	0	0	0	0	0	X	X	X		
1DA	X	X	X	X	X	X	X	X	Privacy mask 6 vertical position shift [little-endian] (compliment on two)	20
1DB	0	0	0	0	0	X	X	X		
1DC	X	X	X	X	X	X	X	X	Privacy mask 7 horizontal position shift [little-endian] (compliment on two)	20
1DD	0	0	0	0	0	X	X	X		
1DE	X	X	X	X	X	X	X	X	Privacy mask 7 vertical position shift [little-endian] (compliment on two)	20
1DF	0	0	0	0	0	X	X	X		
1E0 to 1FF	X	X	X	X	X	X	X	X	Reserved	

---

## The example settings for the privacy mask

In the case of privacy size, the position are related to zoom:

1. Select "Enable" for the privacy mask that links to the zoom function [uCOM 003h.bit0].
2. Zoom position moves to WIDE.
3. Select "Enable" for the privacy mask 0 [DSP 130h.bit0].
4. Set the position and the size for the privacy mask 0 [DSP 140h to 147h].
5. Zoom position moves to TELE.
6. Set the position and the size [DSP 1C0 to 1C3].

## Caution for the privacy mask

The privacy mask 5, 6 and 7 are used to display the priority auto focus detection frame and display the motion detection frame 0 and 1. While displaying the detection frame, the privacy mask does not display, but the value for privacy mask 5, 6 and 7 will be hold.

## Color code list

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

## 6.6 OSCD (On Screen Character Display) command

28 characters per line and 12 lines of the characters can be displayed.

### 6.6.1 Command

Function	1 <sup>st</sup> .Byte	2 <sup>nd</sup> .Byte	3 <sup>rd</sup> .Byte	4 <sup>th</sup> .Byte	5 <sup>th</sup> .Byte	6 <sup>th</sup> .Byte~
Display control	0x07	Value	—	—	—	—
Character size	0x08	Size	—	—	—	—
Character position	0x09	H Start	V Start	—	—	—
Character cursor	0x10	X	Y	—	—	—
Property cursor	0x11	X	Y	—	—	—
Character	0x12	Font	—	—	—	—
Property	0x13	Code	—	—	—	—
Character array	0x14	Font1	Font2	Font3	Font4	. . . . .
Property array	0x15	Code1	Code2	Code3	Code4	. . . . .
Property for character array	0x16	Code	Font1	Font2	Font5	. . . . .

#### Display control

This command controls the characters display.

##### Setting

- Bit 0    0: Character displays OFF, 1: Character displays ON
- Bit 2    The character display is updated when 1 is set. This setting is cleared after update the character display.
- Bit 4    The character display is cleared when 1 is set. This setting is cleared after clear the character display.

Note: The display character does not update newly write characters. It is necessary to update the character display with Bit2 after write mew characters.

#### Character size

This command specifies the character size.  
 Size : 0: Large character, 1: Small character

#### Character position

This command specifies the character display start position. The horizontal and the vertical position can be specified individually.  
 H start : Horizontal display start position  
 V start : Vertical display start position

#### Character cursor

This command specifies the character display position.  
 X: Horizontal position (0 to 27)  
 Y: Vertical line (0 to 11 line)

#### Property cursor

This command specifies the character property position.  
 X: Horizontal position (0 to 27)  
 Y: Vertical line (0 to 11 line)

### Character (Character control)

This command writes the display character with the character cursor specified position.

The character cursor increments automatically after write the character.

When the horizontal cursor reaches to the right end (27), the cursor for the next character is the beginning of the next line.

### Character code

Font	Character	Font	Character	Font	Character	Font	Character
000	Blank	010	F	020	V	030	*
001	0	011	G	021	W	031	%
002	1	012	H	022	X	032	+
003	2	013	I	023	Y	033	-
004	3	014	J	024	Z	034	x
005	4	015	K	025	!	035	/
006	5	016	L	026	?	036	=
007	6	017	M	027	#	037	"
008	7	018	N	028	&	038	'
009	8	019	O	029	(	039	_
00A	9	01A	P	02A	)	03A	@
00B	A	01B	Q	02B	,		
00C	B	01C	R	02C	_		
00D	C	01D	S	02D	:		
00E	D	01E	T	02E	;		
00F	E	01F	U	02F	~		

### Property

This command specifies the property of the character that is defined by the character cursor command.

- |                        |                       |   |
|------------------------|-----------------------|---|
| Bit 0: Font background | 0: Transparency color | 1: Background color                           |
| Bit 1: Font reverse    | 0: Normal             | 1: Reverse the character and background color |
| Bit 2: Font bordering  | 0: No bordering       | 1: With bordering                             |

### Character array (Character control)

This command writes the display characters that start with defined character cursor continuously.

The character cursor increments with the number of written characters automatically after write the characters.

When the horizontal cursor reaches to the right end (27), the cursor for the next character will be the start of the next line.

### Property array

This command specifies the property of the characters that are defined by the property cursor command.

The property cursor is increment with the number of written characters automatically after write the properties.

When the horizontal cursor reaches to the right end (27), the cursor for the next property will be the start of the next line.

### Property for character array

This command specifies the property of all the characters that are defined by the character cursor command continuously.

The character cursor increments with the number of written characters automatically after write the characters.

When the horizontal cursor reaches to the right end (27), the cursor for the next character will be the start of the next line.

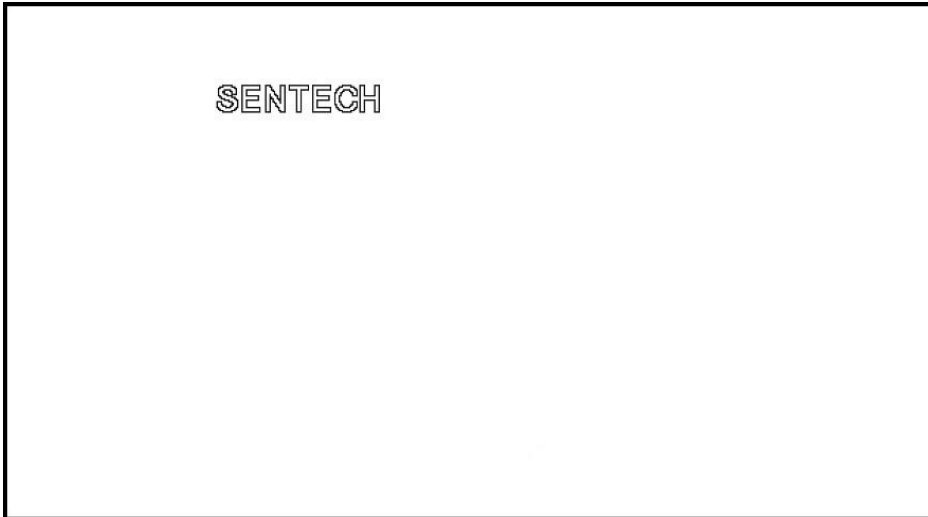
## 6.6.2 Sample command

Sample sending command and the character displaying

### Sending command

Set the character cursor	02 50 80 03 10 04 01 E8 03 (Set character position, 5 <sup>th</sup> at horizontal and 2 <sup>nd</sup> line at vertical)
Set the property for the character array	02 50 80 09 16 04 1D 0F 18 1E 0F0D 12 83 03 (Set S, E, N, T, E, C, H with bordering)
Display control	02 50 80 02 07 05 DE 03 (Character display is ON and update the screen)

### Character display



## 7 Camera Setting Guideline

The following two methods can manipulate the camera.

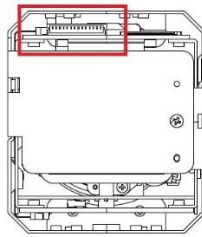
- A. Via external switch (SDI model only).
- B. Via serial communication \*As for details, please refer to another chapter.

### 7.1 Camera setting via external switch(SDI model only)

#### 7.1.1 Camera setting via switch connect to CN06

A. Assign the switch function via communication software before using.

B. Camera Connector (Back side).

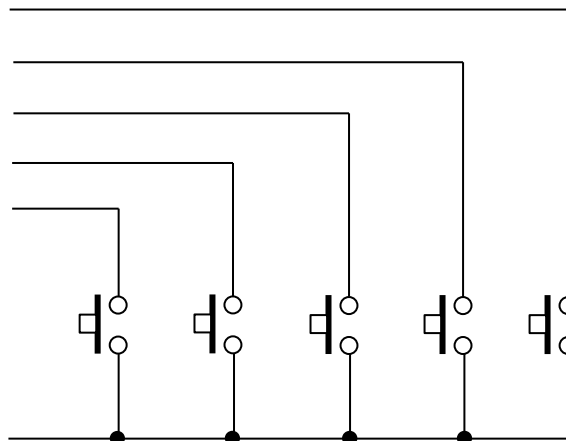


C. Switch circuit diagram.

CN06 Pin No.

- ⑨KEY ENTER
- ⑩KEY UP
- ⑪KEY DOWN
- ⑫KEY RIGHT
- ⑬KEY LEFT

⑥GND



D. Switch Button Function.

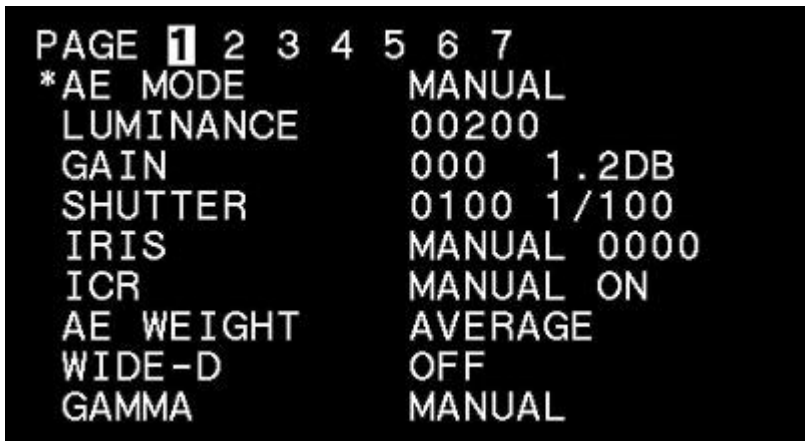
The following functions are assigned to SW-A to SW-E.

- SW-A: Show OSD menu
- SW-B: Select Up (Menu and select setting)
- SW-C: Select Down (Menu and select setting)
- SW-D: Select Left (select setting)
- SW-E: Select Right (select setting)

## 7.1.2 OSD display with external switch

\* OSD menu display can be manipulated on uCOM register 056H.

Page 1



### 1) AE MODE

Set Enable / Disable of Auto Exposure (Default: AGC+AI).

#### a) AGC

Control the Gain automatically on AE MODE.

#### b) AEE

Control the Exposure time on AE MODE.

#### c) AI

Control the IRIS Open Ration on AE MODE.

#### d) FULL AUTO

All of AGC,AEE and AI are set to ON.

#### e) MANUAL

All of AGC,AEE and AI are set to OFF.

#### f) AGC+AEE,AGC+AI,AEE+AI

Combine the mode like AGC+AEE,AGC+AI,AEE+AI on AE MODE.

### 2) LUMINANCE

Set the target Luminance.

### 3) GAIN

Set the Gain when AGC OFF.

### 4) SHUTTER

Set the Exposure Time when AEE OFF.

### 5) IRIS

Set the IRIS open ratio when AI ON / OFF switch timing or AI OFF.

6) ICR

Select the IR cut filter position when AUTO ICR ON / OFF or AUTO ICR MANUAL.

7) AE WEIGHT

Set the weight ratio on AE.

a) AVERAGE

Average Photometry.

b) GRAVITY

Gravity Photometry.

c) SPOT

Spot Photometry.

d) BACK LIGHT

Back Light compensation.

8) WIDE-D

Sets Enable / Disable wide dynamic range.

a) OFF

Wide Dynamic Range OFF.

b) ON

Wide Dynamic Range ON.

c) DEFOG

De-fog function ON.

9) GAMMA

Set the Gamma value (Default: MANUAL).

Select the value from MANUAL, 0.45, 0.60, 0.80, 1.00.



```
PAGE 1 2 3 4 5 6 7
*WB MODE      AWB
USER R/G      04565
USER B/G      04191
BRIGHT        000
CONTRAST      128
SHARPNESS     H000      V016
COLOR         COLOR
              GAIN 128   HUE 000
NR            00
CAC           OFF 064
```

- 1) WB MODE  
Set the White Balance mode(default: AWB).
  - a) AWB  
Set the Auto White Balance to control white balance.
  - b) FULL OPEN  
Set the full open of WB. As for the detail, please refer to the another chapter.
  - c) AWB HOLD  
Hold the current white balance.
  - d) CUSTOM  
Set the specific color temperature.
  - e) USER MODE  
Adjust the white balance to set USER R/G or USER B/G by user.
- 2) USER R/G  
Set the R/G Gain on WB MODE when USER MODE is selected.
- 3) USER B/G  
Set the B/G Gain on WB MODE when USER MODE is selected.
- 4) BRIGHT  
Set the Brightness of the image (default: 0).
- 5) CONTRAST  
Set the Contrast of the image (default: 128).
- 6) SHARPNESS  
Set the Sharpness (Edge / Coring) of the image (default: 0).
- 7) COLOR  
Set the Color of the image (default: COLOR).

a) COLOR

Show color image.

b) B&W

Show monochrome image.

c) NEGA POSI

Show Monochrome inversion image.

GAIN

Adjust the Color Shading.

HUE

Adjust the Hue.

8) NR

Set the Noise reduction Level (Default 0).

9) CAC

Set Chromatic Aberration Correction ON / OFF and set the level (Default: OFF, 064).

```
PAGE 1 2 3 4 5 6 7
*AF MODE OFF
INTERVAL OFF 005
ZOOM TRIGGER OFF 005
SENSITIVITY NORMAL
AF SPEED FAST
ZOOM SPEED 00
FOUUS SPEED 00
NEAR LIMIT 1M
```

- 1) AF MODE  
Select the Auto Focus MODE(default: ON).
- 2) INTERVAL  
Select interval AF MODE ON/OFF and set time.
- 3) ZOOM TRIGGER  
Select ZOOM TRIGGER AF MODE ON/OFF and set time.
- 4) SENSITIVITY  
Set the sensitivity to start AF(Default: NORMAL).
  - a) NORMAL  
Start to focus with following the moving object.
  - b) LOW  
Un-focus and stable the image when fast moving object or small variation object appears.
- 5) AF SPEED  
Set the Auto Focus speed on TELE side (Default: FAST).
- 6) ZOOM SPEED  
Set the zoom adjustment speed (Default: 0).
- 7) FOCUS SPEED  
Set the focus position adjustment speed (Default: 0).
- 8) NEAR LIMIT  
Set the limitation on minimum working distance (Default: 1M).

```
PAGE 1 2 3 4 5 6 7
*MASK NO.      00
  ENABLE      OFF
  COLOR       RED
  TRANSPARENT  OFF
  WIDTH       0020
  PAN         -0075
  HEIGHT      0020
  TILT        -0030
```

- 1) MASK NO  
Set the Privacy Mask number.
- 2) ENABLE  
Set Enable/Disable for Privacy Mask that is selected on 1).
- 3) COLOR  
Set Privacy Mask color for Privacy Mask that is selected on 1).
- 4) TRANSPARENT  
Set Privacy Mask transparency for the Privacy Mask that is selected on 1) (Default: OFF).
- 5) WIDTH  
Set Privacy Mask Horizontal width for the Privacy Mask that is selected on 1).
- 6) PAN  
Set Privacy Mask Horizontal position for the Privacy Mask that is selected on 1).
- 7) HEIGHT  
Set Privacy Mask Vertical width for the Privacy Mask that is selected on 1).
- 8) TILT  
Set Privacy Mask Vertical position for the Privacy Mask that is selected on 1).

Page 5

```
PAGE 1 2 3 4 5 6 7
*LINE OFF
  LINE1 H POS0100 SIZE0006
        COLOR RED
        V POS0100 SIZE0006
        COLOR RED
  LINE2 H POS0620 SIZE0006
        COLOR BLUE
        V POS1180 SIZE0006
        COLOR BLUE
```

1) LINE1,LINE2

Set to Enable/Disable Line Marker (Default: OFF).

a) ON

Show Line Marker.

Horizontal Line Marker, Vertical Line Marker can be set individually.

Position, Size and Color can be set. When Size is set to 0, Line disappears.

When Position is set to 0, horizontal line marker will be at the Top, and vertical line marker will be at the Left.

Color can be selected from Black, White, Red, Green, Blue, Cyan, Magenta, Yellow and User define color.

b) OFF

Disable Line Marker.

```
PAGE 1 2 3 4 5 6 7
*SHADOW      OFF  GRADE 00
      H T0000  B1080
      V L0000  R1920
```

## 1) SHADOW

Set Enable / Disable Shadow Mask (default: ON).

### a) ON

Show Shadow Mask.

Set always ON on GRAPHICS.

Horizontal Line Marker, Vertical Line Marker can be set individually.

Position, Size and Color can be set when Size is set to 0, Line disappears.

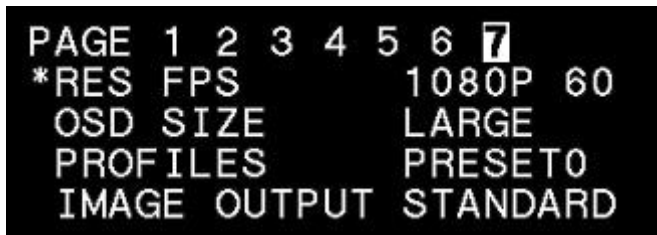
When Position is set to 0, horizontal line marker will be at the Top, and vertical line marker will be at the Left.

### b) OFF

Disable Shadow Mask.

### C) GRADE

Set Shadow Mask's shading.



- 1) RES / FPS  
Show the Frame rate (Frequency) of video output.
- 2) OSD SIZE  
Set the character size of OSD (Default: LARGE).
  - a) LARGE  
Show larger character on OSD.
  - b) SMALL  
Show smaller character on OSD.
- 3) PROFILE  
Load the preset data from PRESET0 to PRESET7 (Default: PRESET0)
  - a) PRESET0 to PRESET7  
Load selected PRESET data.
- 4) IMAGE OUTPUT  
Select video output.
  - a) STANDARD  
Output Normal image.
  - b) INVERSION  
Output Horizontal Flip image.
  - c) V INVERSION  
Outputs Vertical Flip image.
  - d) HV INVERSION  
Output Horizontal and Vertical Flip image.

---

Page 8



PAGE 1 2 3 4 5 6 7  
\*EEPROM SAVE

1) EEPROM

Modified settings on Page1 to Page7 can be saved as default.

a) SAVE

Select and execute SAVE, confirmation message (ARE YOU OK?) will show up.

Select execute again, camera setting will be saved into camera as default.

Confirmation message (CMOPLETE) will show up, saving process is completed.

Cancel the saving process, when execute "Execution" on confirmation message (ARE YOU OK?)



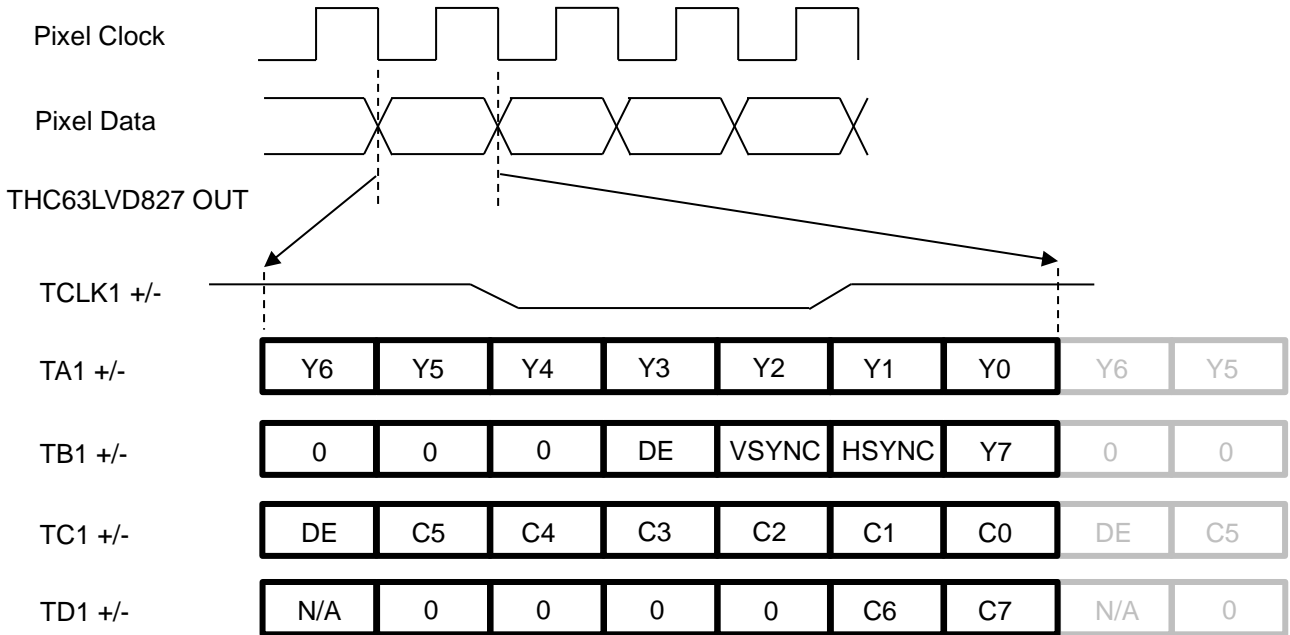
## 7.2 LVDS Interface (LVDS model only)

### 7.2.1 LVDS Pixel Data Format

Camera Transmitter : THC63LVD827

Single Mode

THC63LVD827 IN



Output Format	Pixel Clock(Hz)	TCLK+(Hz)
1080p/60	148.5M	148.5M
1080p/50	148.5M	148.5M
1080p/30	74.25M	74.25M
1080p/25	74.25M	74.25M
720p/60	74.25M	74.25M
720p/50	74.25M	74.25M
(1080p/59.94)	148.5M/1.001	148.5M/1.001
(1080p/29.97)	74.25M/1.001	74.25M/1.001
(720p/59.94)	74.25M/1.001	74.25M/1.001

Double Mode

THC63LVD827 IN

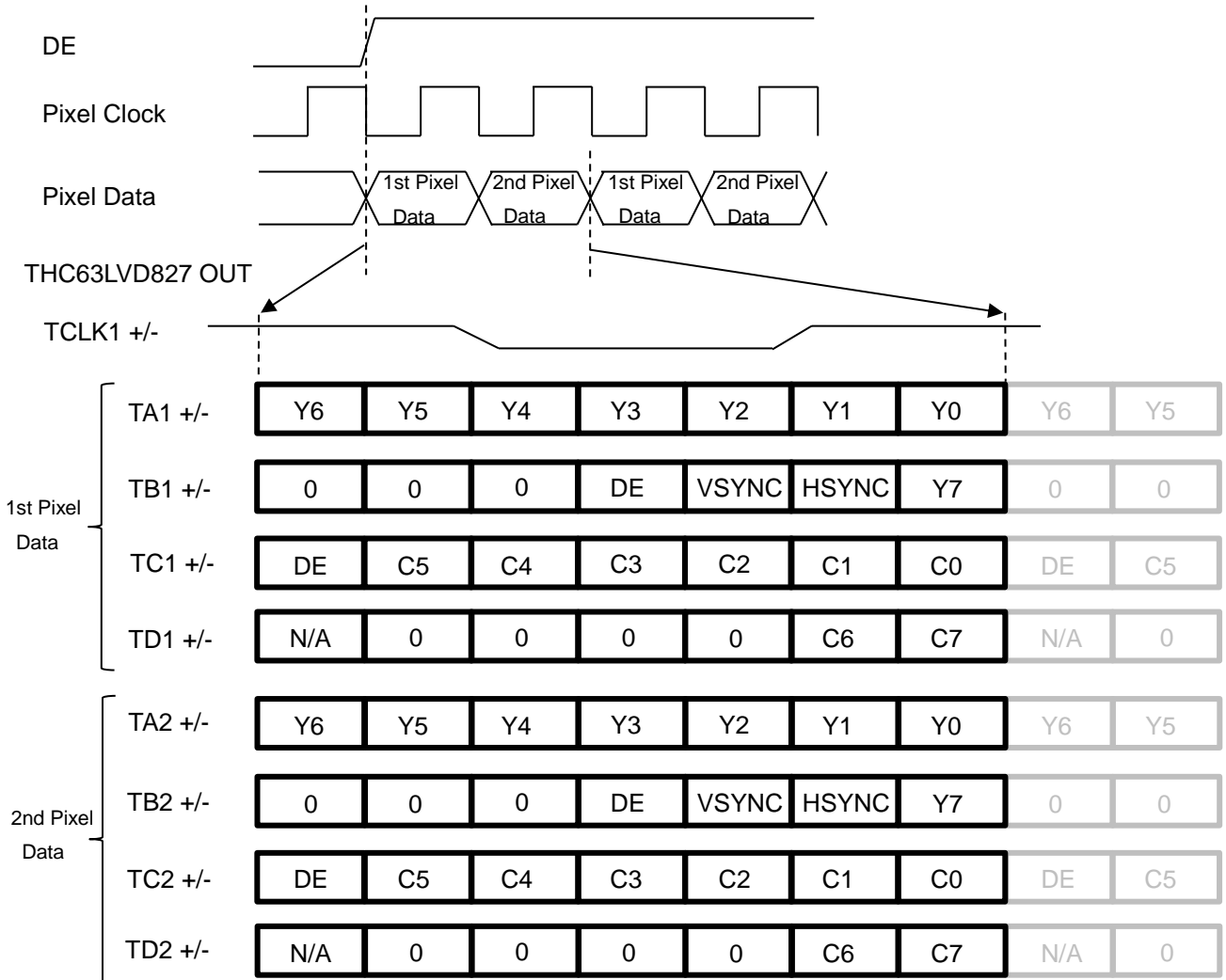
DE

Pixel Clock

Pixel Data

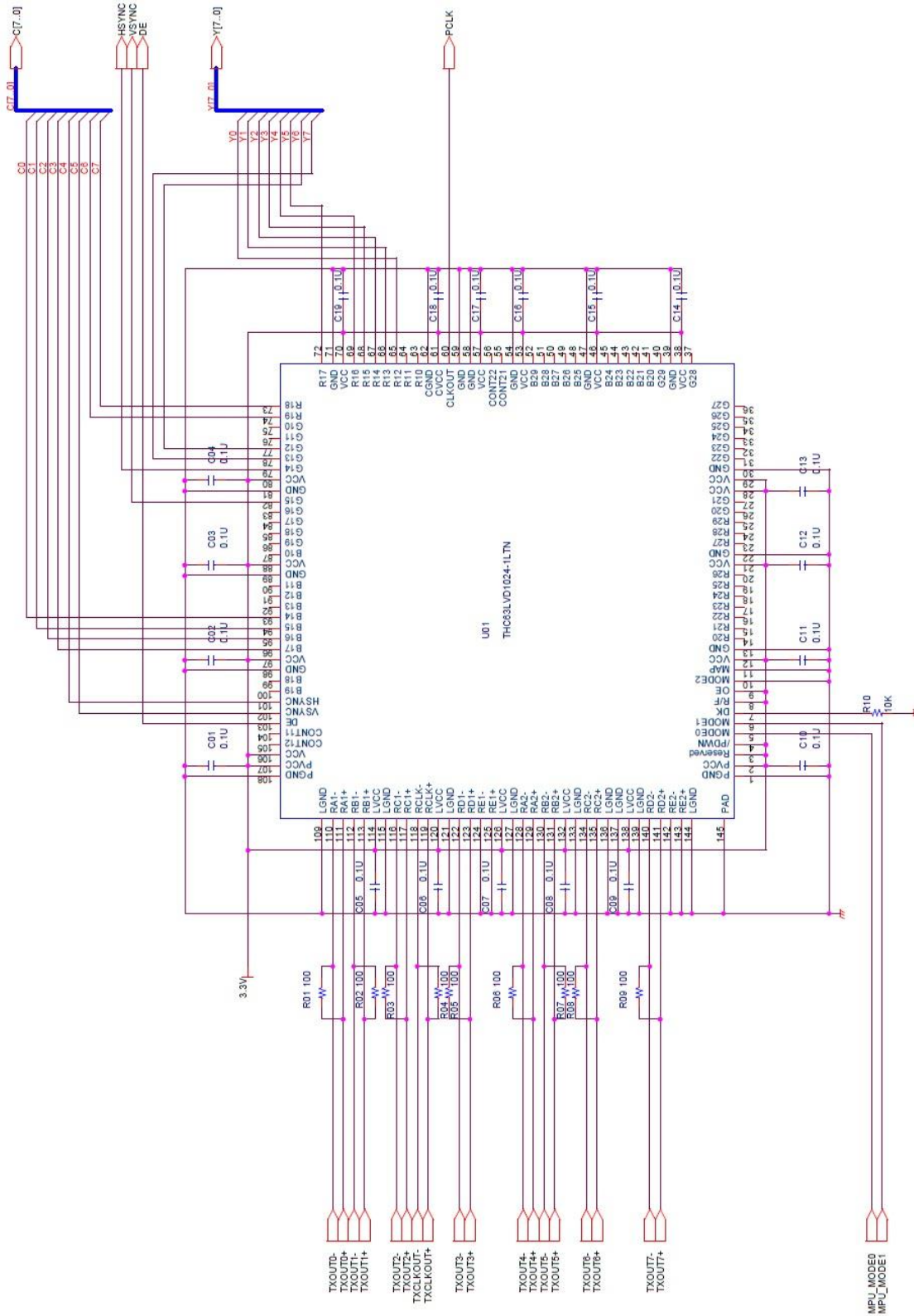
THC63LVD827 OUT

TCLK1 +/-



Output Format	Pixel Clock(Hz)	TCLK+(Hz)
1080p/60	148.5M	74.25M
1080p/50	148.5M	74.25M
1080p/30	74.25M	37.125M
1080p/25	74.25M	37.125M
720p/60	74.25M	37.125M
720p/50	74.25M	37.125M
(1080p/59.94)	148.5M/1.001	74.25M/1.001
(1080p/29.97)	74.25M/1.001	37.125M/1.001
(720p/59.94)	74.25M/1.001	37.125M/1.001

## 7.2.2 Example of receiver Circuite



Mode Settings	MPU_MODE0	MPU_MODE1
---------------	-----------	-----------

Single Mode	High	High
Double Mode	High	Low

## 8 Revision History

Rev	Date	Changes	Note
00	2015/12/09	New document	
	2015/12/28	Added Users guide for the communication software	
		Added Protocol specifications	
		Added P.21 AWB offset	
		Added P.14 Gamma offset	
		Added P.48 to P.49 AWB offset and Gamma offset on Register Map	
		Revised P.52 Default value on Color saturation adjustment (128→100)	

### Note

Specifications are subject to change without notice.

**Sentech Co., Ltd**

7F, Harada center building  
9-17, Naka cho 4 chome  
Atsugi-city, Kanagawa  
243-0018 Japan  
TEL 81-46-295-7061 FAX 81-46-295-7066  
URL <http://www.sentech.co.jp/>