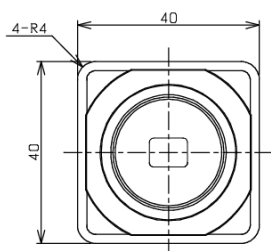
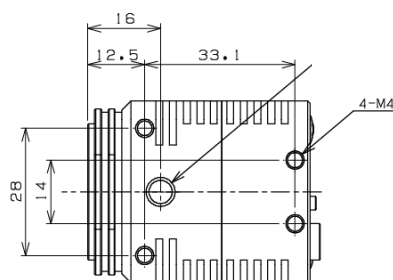
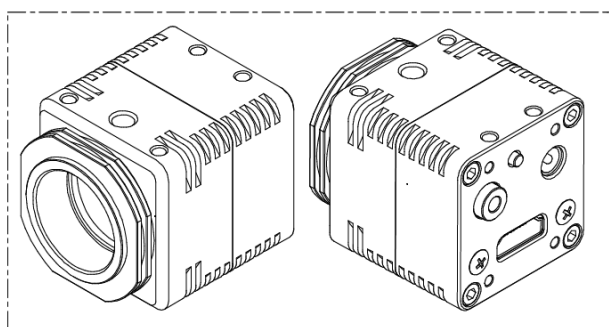
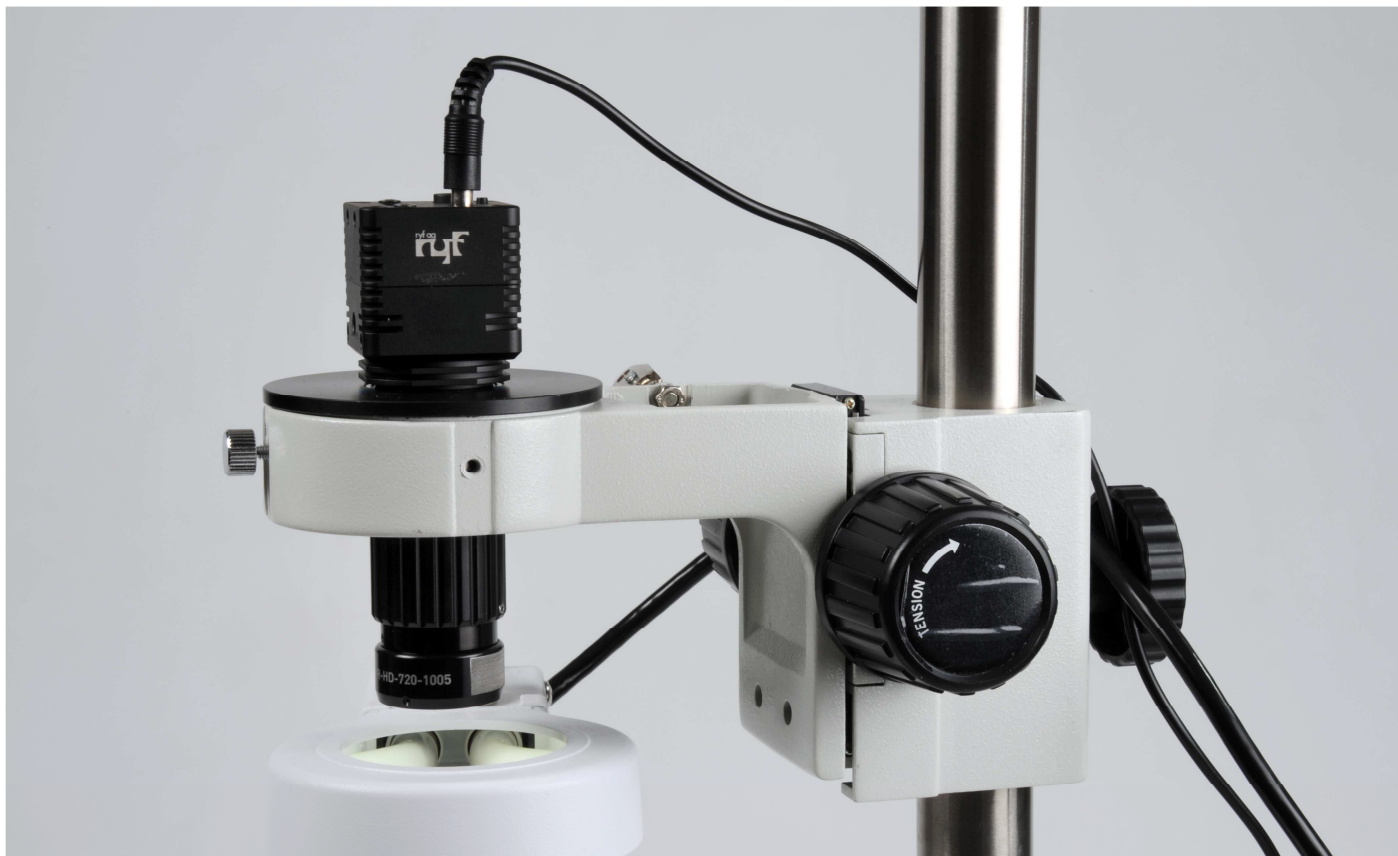
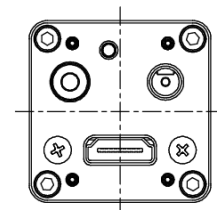
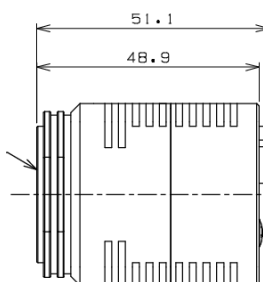
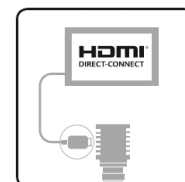
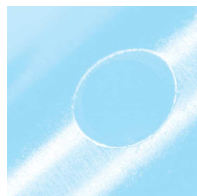


Manual Ryf HDMI Kamera R-FHD-1080



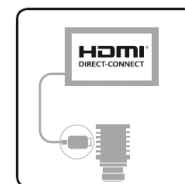
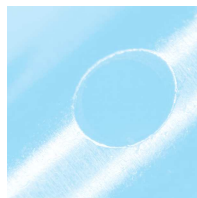
1" - 32UNF





Manual Ryf HDMI Kamera R-FHD-1080

Product		STC-HD203** (Cased type)	
Electronic specifications	Imager	1/2.8" 230Mega 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) μm	
	Sync system	Progressive	
	Minimum scene illumination	TBD Lux (AGC ON)	
	Sync. System	Internal	
	Video output	DVI Model	DVI 1.0 conformity RGB, 1080P60, 1080P59.94, 1080P50, 1080P30, 1080P29.97, 1080P25, 720P60, 720P59.94, 720P50 (Default: 1080P60)
		SDI Model	3G-SDI (SMPTE 424M Compliant), 4:2:2 YCbCr 10bit 1080P60/59.94/50 HD-SDI (SMPTE 292M Compliant) 4:2:2 YCbCr 10bit 1080P30/29.97/25 720P60/59.94/50
Camera functions	ALC	Can be configured via the UART communication with auto electronic shutter and AGC	
	Shutter speed	Adjustable shutter speed via the UART communication (AEE) (Default: Auto)	
		Extended	Extend shutter frame unit (Up to 2.55 sec)
		High speed	Up to 1/10,000 seconds
	Gain	AGC or Fixed gain selectable via the UART communication 0 to 45 dB	
	Gamma	Selectable gamma through 5 preset (one preset is manual, / 0.45 / 0.6 / 0.8 / 1) Selectable gamma via the UART communication (Default: manual)	
	White balance	Auto white balance / manual white balance / push to set white balance Selectable white balance via the UART (Default: Auto white balance)	
	WDR	Wide Dynamic Range OFF/ON (Default: OFF) WDR enable via the UART communication	
	Mirror image	Normal image / horizontal flip / vertical flip / horizontal vertical flip (180 degree rotation) Default: Normal image	
	Picture modes	8 user preset mode, Normal picture mode or pseudo color mode can be selectable Selectable picture mode via the UART communication (Default: Preset 0)	
	Line generator	Both horizontal and vertical with all available colors (Line number: 2) Adjustable thickness via the UART communication (Default: Disable)	
	Shadow mask generator	Both horizontal and vertical with shading level adjustment via the UART communication (Default: Disable)	
	Freeze image	Selectable Live image or freeze image via the UART communication	
	Communication	+3.3V UART communication via 3.5Φ stereo jack (Baud rate: 38,400bps, 19,200bps, 9,600bps)	
	Power	Character generator	Built-in character generation function via the UART communication
Pixel blemish collection		Support	
Mechanical specifications	Input voltage	+9 to +15 Vdc (Typical: +12 Vdc)	
	Consumption	4.4W (preliminary)	
	Dimensions	40 (W) x 40 (H) x 51.1 (D) mm (Excluding the connector)	
	Optical filter	IR cut filter with OPLF	
	Material	Aluminum (AC)	
	Lens mount	C mount (Recommendation F: more than 2.0))	
	Interface connector	Video output	DVI Output : HDMI connector, SDI Output : BNC connector
		Power input	+9 to +15 Vdc (Typical: +12 Vdc)
		External control	3.5Φ stereo jack with SW board
		Communication	3.5Φ stereo jack
Weight	Approximately 116g		
Environmental specifications	Operational temperature	-0 to 40 deg. C	
	Storage temperature	-30 to 65 deg. C	
	Vibration	20Hz to 200Hz to 20Hz (5min./cycle), acceleration 10G, XYZ 3 directions 30 min. each	
	Shock	Acceleration 38G, half amplitude 6ms, XYZ 3 directions 3times each	
	Standard compliancy	EMS: EN61000-6-2, EMI: EN55022 (Class B)	
	RoHS	RoHS compliance	



Manual Ryf HDMI Kamera R-FHD-1080

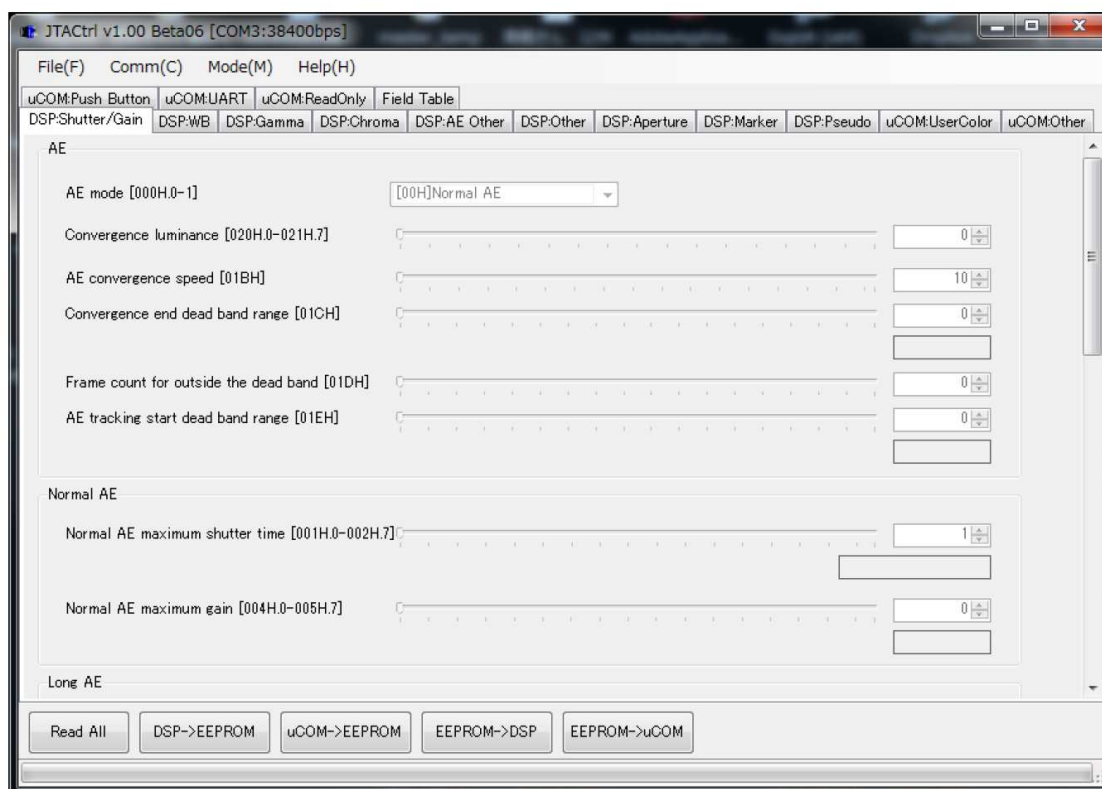
4 Control Software User's Guide

4.1 Requirements

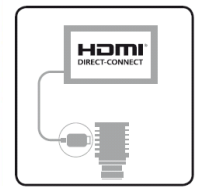
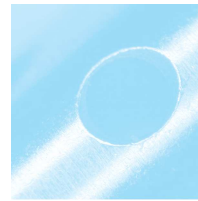
- +12V DC Power Supply
- Remote Control
- Communication Tool
- Control Software

4.2 Basic Operating Procedure

- Connect the power supply with the camera, as well as connecting the Communication tool with the PC via USB cable.
- After JTA Ctrl has been installed, the control software can be launched from JTACtrl.exe



- Select the COM port number through COMM(C) → Port Setting
- Click Read All to read all of the register values from the camera.
- All of the camera settings can be configured through the control software.



Manual Ryf HDMI Kamera R-FHD-1080

4.3 Button Description



Read All

Read out All of the DSP register and the uCOM register values on the camera. Please execute this command every time the camera is started up.

DSP → EEPROM

Save the DSP register values into the EEPROM

uCOM → EEPROM

Save the uCOM register values into the EEPROM

EEPROM → DSP

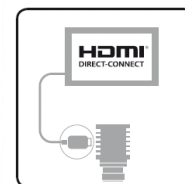
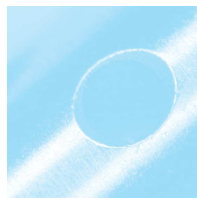
Read the DSP register values on the EEPROM

EEPROM → uCOM

Read the uCOM register values on the EEPROM

4.4 Differences between the uCOM and DSP Register

The main difference is that the DSP register is mainly where video control functions are stored along with the eight User Presets that the user can load for different applications. The uCOM is primarily used for communication and other functions.

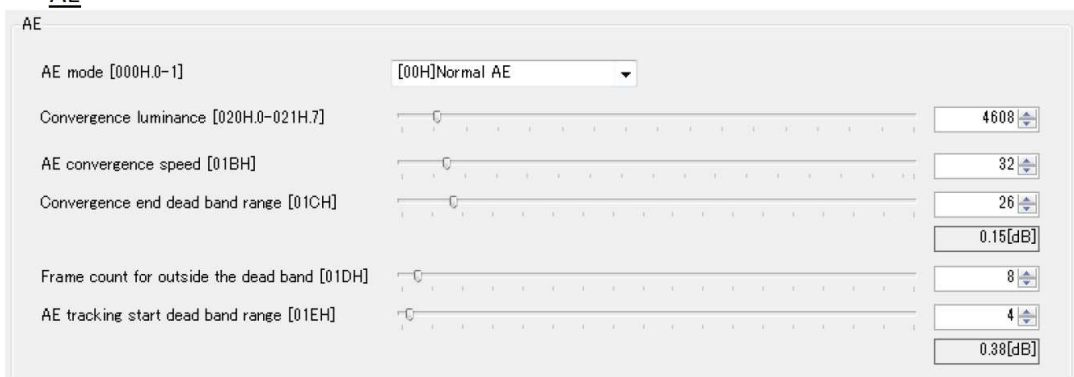


Manual Ryf HDMI Kamera R-FHD-1080

4.5 Functional Description

DSP: Shutter/GainTab

AE



Parameter	Value
AE mode [00H.0-1]	[00H]Normal AE
Convergence luminance [020H.0-021H.7]	4608
AE convergence speed [01BH]	32
Convergence end dead band range [01CH]	26
Frame count for outside the dead band [01DH]	8
AE tracking start dead band range [01EH]	4
	0.15[dB]
	0.38[dB]

AE mode

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

Convergence luminance

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

AE convergence speed

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

Convergence end dead band range

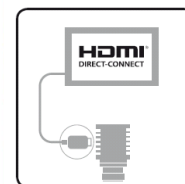
This setting is used to set the range in which convergence is to be identified.

Frame count for outside the dead band

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

AE tracking start dead band range

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



Manual Ryf HDMI Kamera R-FHD-1080

Normal AE

Normal AE

Normal AE maximum shutter time [001H.0-002H.7] 200
 20.0[ms], 1/60.0[s]

Normal AE maximum gain [004H.0-005H.7] 140
 42.0[dB]

Long AE

Long AE

Long AE normal shutter time [006H.0-007H.7] 166
 16.6[ms], 1/60.2[s]

Long AE expanded shutter time [008H.0-009H.7] 333
 33.3[ms], 1/30.0[s]

Long AE maximum shutter time [00AH.0-00BH.7] 600
 150.0[ms], 1/6.7[s]

Long AE low gain [00CH.0-00DH.7] 87
 26.1[dB]

Long AE high gain [00EH.0-00FH.7] 120
 36.0[dB]

Long AE maximum gain [010H.0-011H.7] 140
 42.0[dB]

Priority Mode

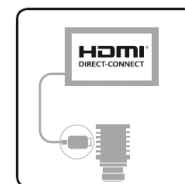
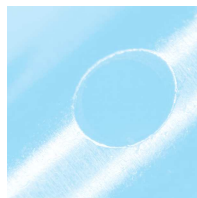
Priority Mode

Gain priority [028H.0-4] [00H]No priority

Shutter priority [029H.0-02AH.7] 0

When Normal AE or Long AE is selected on AE Mode, this setting might be reflected. If User likes to use Fixed Gain or Fixed Shutter, this Priority Mode should be selected.

USER Mode

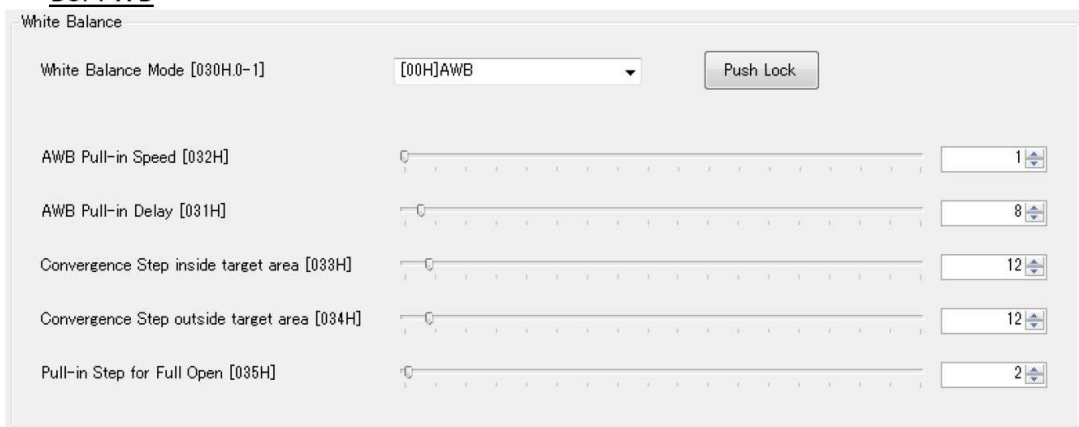


Manual Ryf HDMI Kamera R-FHD-1080



When User likes to use Fixed Gain or Fixed Shutter, this mode can be used when USER mode is selected on AE mode.

DSP: WB



White Balance

AWB, Full-Open, AWB Hold, USER Mode can be selectable. When User likes to use Fixed White Balance, please select USER Mode.

AWB Pull-in Speed

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

AWB Pull-in Delay

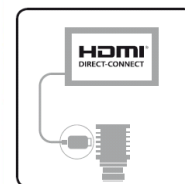
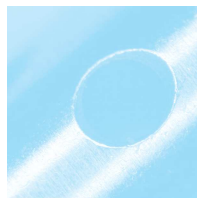
When a status outside the dead band has been detected in the AWB mode, pull-in is started after achieving consistency in the number of frames specified by this setting. Unit: Frame number

Convergence Step inside target area

The AWB pull-in steps inside target area can be indicated. When set step shortly, the convergence speed of white balance is faster.

Convergence Step outside target area

The AWB pull-in steps outside target area can be indicated. When set step shortly, the convergence speed of white balance is faster.



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Pull-in Step for Full Open

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

USER Mode

USER Mode

User Mode fixed coordinate R/G [036H.0-037H.7]

User Mode fixed coordinate B/G [038H.0-039H.7]

When White Balance mode is on USER mode. Fixed White Balance can be set.

DSP: Gamma

Gamma

Gamma Mode [043H.0-2]

Gamma Output Selection [043H.3-4]



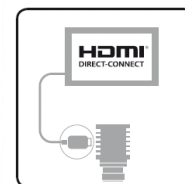
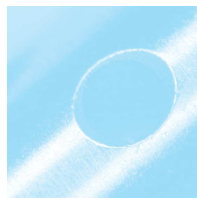
Gamma Curve

Manual Gamma

Gamma KNOT00 <input type="text" value="408"/>	Gamma KNOT14 <input type="text" value="1088"/>
Gamma KNOT01 <input type="text" value="432"/>	Gamma KNOT15 <input type="text" value="1168"/>
Gamma KNOT02 <input type="text" value="464"/>	Gamma KNOT16 <input type="text" value="1240"/>

Gamma Mode

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



Manual Ryf HDMI Kamera R-FHD-1080

Gamma Output Selection

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

DSP: Chroma

Chroma

Hue Adjustment [07CH]

Saturation Adjustment [07DH]

Hue Adjustment

The hue can be adjusted.

Saturation Adjustment

The Saturation can be adjusted.

DSP: AE Other

Flickerless mode
 Flickerless mode [01AH.0-2]

Photometry mode
 Photometry mode [080H.0]

Weight photometry

5	8	10
11	13	11
10	8	5

0frame coefficient [081H]

1frame coefficient [082H]

2frame coefficient [083H]

3frame coefficient [084H]

4frame coefficient [085H]

5frame coefficient [086H]

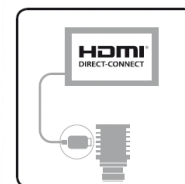
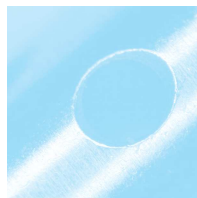
6frame coefficient [087H]

7frame coefficient [088H]

8frame coefficient [089H]

Flickerless mode

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



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Photometry mode

In order to achieve the optimum luminance, this photometry mode automatically adjusts the gain value and exposure time to achieve the optimum luminance level by detecting the luminance signals in the screen region using 9 frames (3 horizontal x 3 vertical frames) and giving weighting to this region on the screen or, alternatively, it adds up the total number of luminance levels, measures the histograms and gives weight to them. Among the former modes are the average photometry, weighted photometry modes.

DSP: Other

Resolution/FrameRate [040H.0-3]	[00H]1080p 60fps
Image Output Inversion [041H.0-1]	[00H]Standard
Sharpness Gain [07EH]	64
ATR-EX function [07FH.0]	[00H]OFF
Color/Black and white [12AH.7]	[00H]Color
Contrast [129H]	128
RGB offset [12AH.0-6]	0

Resolution/FrameRate

Select the output video format.

Image Output Inversion

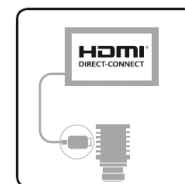
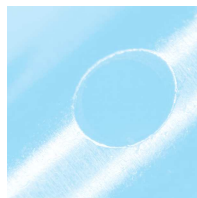
Select the H,V Inversion image.

Sharpness Gain

Set the Sharpness value.

ATR-EX function

When both low-luminance areas and high-luminance areas exist on one screen, AE controls the exposure in such a way that the exposure is appropriate for the high-luminance areas, loss of dark detail will occur; conversely, overexposure will occur if AE controls the exposure so that it is appropriate for the low-luminance areas. This happens because the luminance of images tends toward either the high-luminance side or low-luminance side. Both overexposure and loss of dark detail can be avoided and images with the appropriate contrast can be achieved by compressing the low- and high-luminance areas for the image components in one field toward medium luminance and compensating the high-visibility medium-luminance areas toward the appropriate gray scale. The function used to achieve this is called ATR-EX (Augmenting Tone Reproduction) or WDR (Wide Dynamic Range).



Manual Ryf HDMI Kamera R-FHD-1080

Color/Black and white

Select the Color or Monochrome image..

Contrast

Set the Contrast value.

RGB offset

Set the offset on Video image.

DSP: Aperture

Back Aperture

Aperture H. gain in back process [12BH.0-3]	<input type="range"/>	<input type="text" value="0"/>	<input type="text" value="0.00"/>
Aperture V. gain in back process [12BH.4-7]	<input type="range"/>	<input type="text" value="0"/>	<input type="text" value="0.00"/>
Aperture coring in back process [12CH.0-5]	<input type="range"/>	<input type="text" value="0"/>	<input type="text" value="0.00"/>

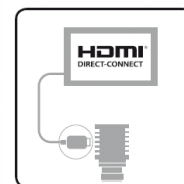
The aperture compensation function is used to enhance the perceived resolution by emphasizing the edge areas of the images. To emphasize the edges, increase the aperture compensation gain value. However, if this gain is increased too much, noise which manifests as a roughness of the images becomes noticeable.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

DSP: Marker

Set the Horizontal/Vertical line marker and shadow.

Marker

Marker [100H.7]	<input type="text" value="[01H]Enabled"/>
-----------------	---



Manual Ryf HDMI Kamera R-FHD-1080

Marker

Set the line marker and shadow.

Line Marker

Line marker [100H.0]	<input type="checkbox"/> [01H]Enabled
Horizontal line1 marker color [10AH.4-7]	<input type="checkbox"/> [00H]Black
Horizontal line1 marker position [10BH.0-10CH.2]	<input type="checkbox"/> 0
Horizontal line1 marker thickness [10DH.0-10EH.2]	<input type="checkbox"/> 0
Vertical line1 marker color [10AH.0-3]	<input type="checkbox"/> [00H]Black
Vertical line1 marker position [10FH.0-110H.2]	<input type="checkbox"/> 0
Vertical line1 marker thickness [111H.0-112H.2]	<input type="checkbox"/> 0
Horizontal line2 marker color [113H.4-7]	<input type="checkbox"/> [00H]Black
Horizontal line2 marker position [114H.0-115H.2]	<input type="checkbox"/> 0
Horizontal line2 marker thickness [116H.0-117H.2]	<input type="checkbox"/> 0

Line Marker

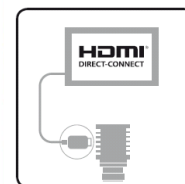
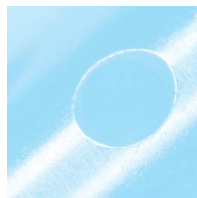
Set the color, position, size of two line markers.

Shadow Mask

Shadow mask [100H.1]	<input type="checkbox"/> [01H]Enabled
Shadow mask shading level [101H]	<input type="checkbox"/> 0
Horizontal shadow mask top position [102H.0-103H.2]	<input type="checkbox"/> 0
Horizontal shadow mask bottom position [104H.0-105H.2]	<input type="checkbox"/> 1080
Vertical shadow mask left position [106H.0-107H.2]	<input type="checkbox"/> 0
Vertical shadow mask right position [108H.0-109H.2]	<input type="checkbox"/> 1920

Shadow Mask

Set the shadow mask on top, bottom, left, right side.



Manual Ryf HDMI Kamera R-FHD-1080

DSP: Pseudo

Picture mode selection [125H.0]

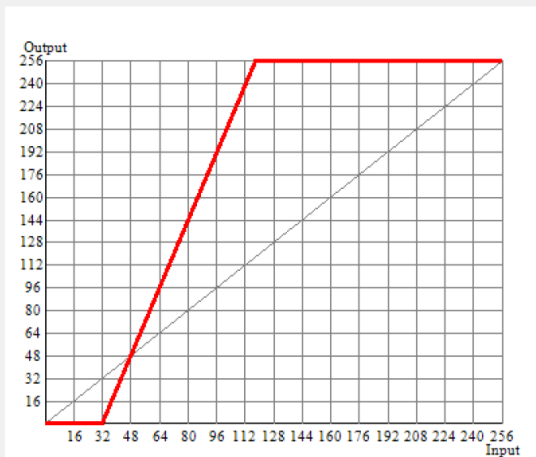
Background pseudo color [126H.0-3]

Overlay graphics pseudo color [126H.4-7]

Normal color mode shadow mask line color [125H.1]

Pseudo color threshold [127H]

Pseudo color slope [128H]



Picture mode selection

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

Background pseudo color

Convert the brighter image into selected color.

Over graphics pseudo color

Convert the darker image into selected color.

Normal color mode shadow mask line color

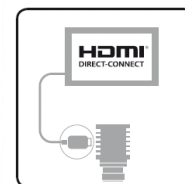
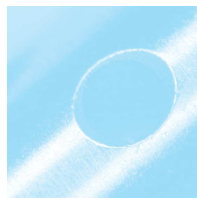
Select the line color of shadow mask from black or Over graphics pseudo color.

Pseudo color threshold

Set the threshold to bipolarize the input video image.




Pseudo color slope

Set the slope of bipolarization.



Manual Ryf HDMI Kamera R-FHD-1080

uCOM: User Color

User defined color 0 R [010H]		<input type="text" value="255"/>
User defined color 0 G [011H]		<input type="text" value="128"/>
User defined color 0 B [012H]		<input type="text" value="0"/>
User defined color 1 R [013H]		<input type="text" value="255"/>
User defined color 1 G [014H]		<input type="text" value="0"/>
User defined color 1 B [015H]		<input type="text" value="128"/>
User defined color 2 R [016H]		<input type="text" value="128"/>
User defined color 2 G [017H]		<input type="text" value="255"/>
User defined color 2 B [018H]		<input type="text" value="0"/>

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

uCOM: Other

User Preset

UserPreset [000H.0-2]

User Preset

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

Digital Zoom

Digital zoom [056H]

Digital zoom pan [058H.0-059H.2]

Digital zoom tilt [05AH.0-05BH.2]

Digital Zoom

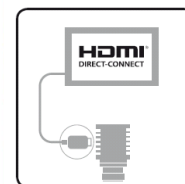
Set the Digital Zoom.

Digital zoom pan

Set the offset on horizontal direction.

Digital zoom tilt

Set the offset on vertical direction.



Manual Ryf HDMI Kamera R-FHD-1080

OSD

OSD menu color [050H.0-2]	[07H]White
OSD character size [050H.3]	[00H]Large
OSD horizontal position [051H]	0
OSD vertical position [052H]	0
OSD RGB level [053H]	186
OSD Edge level [054H]	16

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

Other

Still image [055H.0]	[00H]OFF
Test pattern selection [055H.1-2]	[00H]OFF

Still image

Set the Still video image.

Test pattern selection

Set the test pattern on video output.

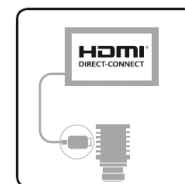
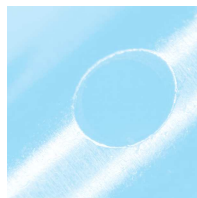
uCOM: Push Button

Button

Push button activation [00EH.0]	[01H]Enable
Menu: page increment [028H.4-7]	[09H]WB
Menu: down [029H.0-3]	[0FH]F
Menu: up [029H.4-7]	[0BH]B
Menu: right [02AH.0-3]	[0EH]E
Menu: left [02AH.4-7]	[0CH]C
Menu: turn off [02BH.0-3]	[0AH]A
Menu: enter [02BH.4-7]	[0DH]D

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

Marker shadow



Manual Ryf HDMI Kamera R-FHD-1080

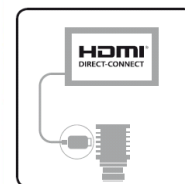
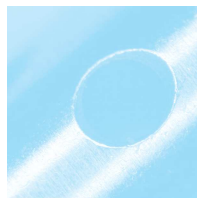
Horizontal line Min. position(for push button) [05CH.0-05DH.2]	<input type="text" value="0"/>
Horizontal line Max. position(for push button) [05EH.0-05FH.2]	<input type="text" value="1920"/>
Horizontal line Max. thickness(for push button) [060H.0-061H.2]	<input type="text" value="1920"/>
Vertical line Min. position(for push button) [062H.0-063H.2]	<input type="text" value="0"/>
Vertical line Max. position(for push button) [064H.0-065H.2]	<input type="text" value="1080"/>
Vertical line Max. thickness(for push button) [066H.0-067H.2]	<input type="text" value="1080"/>
Shadow Horizontal Min. position [068H.0-069H.2]	<input type="text" value="0"/>
Shadow Horizontal Max. position [06AH.0-06BH.2]	<input type="text" value="1920"/>
Shadow Vertical Min. position [06CH.0-06DH.2]	<input type="text" value="0"/>
Shadow Vertical Max. position [06EH.0-06FH.2]	<input type="text" value="1080"/>

Remote controller can set the Marker and Shadow parameters.

Push button (single push/hold)

Primary switch function: single push [039H]	<input type="text" value="[02H]PushLock: WB[Save]"/>
Primary switch function: hold [049H]	<input type="text" value="[03H]WBMode(AWB)[Save]"/>
External switch A function: single push [03AH]	<input type="text" value="[01H]Display Menu"/>
External switch A function: hold [04AH]	<input type="text" value="[00H]Disabled"/>
External switch B function: single push [03BH]	<input type="text" value="[00H]Disabled"/>
External switch B function: hold [04BH]	<input type="text" value="[00H]Disabled"/>
External switch C function: single push [03CH]	<input type="text" value="[00H]Disabled"/>
External switch C function: hold [04CH]	<input type="text" value="[00H]Disabled"/>
External switch D function: single push [03DH]	<input type="text" value="[00H]Disabled"/>
External switch D function: hold [04DH]	<input type="text" value="[00H]Disabled"/>
External switch E function: single push [03EH]	<input type="text" value="[00H]Disabled"/>
External switch E function: hold [04EH]	<input type="text" value="[00H]Disabled"/>
External switch F function: single push [03FH]	<input type="text" value="[00H]Disabled"/>
External switch F function: hold [04FH]	<input type="text" value="[00H]Disabled"/>

Allows the user to select the function for each button.



Manual Ryf HDMI Kamera R-FHD-1080

uCom: UART

UART

UART baud rate [00FH.0-1] [02H]38400bps

UART short reply for write [00FH.6] [00H]Disable

UART check sum [00FH.7] [01H]Enable

Allows the user to set the camera communication.

uCom: ReadOnly

Firmware version [380H.0-381H.7] 5 [0005]

FPGA version [382H.0-383H.7] 7 [0007]

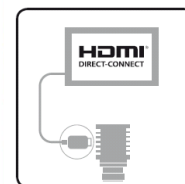
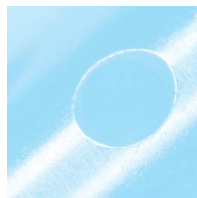
Allows the user to read the Firmware and FPGA revision on the camera.

Field: Table

ShutterGain Tab Page Filter Different Filter

Device	TabPage	Address	Name	EEPROM	Register
DSP	ShutterGain	000H.0-1	AE mode	[00H]Normal AE	[00H]Normal AE
DSP	ShutterGain	001H.0-002H.7	Normal AE maximum shutter time	200	200
DSP	ShutterGain	004H.0-005H.7	Normal AE maximum gain	140	140
DSP	ShutterGain	006H.0-007H.7	Long AE normal shutter time	166	166

This functions shows all of the register settings from the registers.



Manual Ryf HDMI Kamera R-FHD-1080

5 Communication Protocol Specifications

5.1 Communication Settings

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

5.2 Communication Format

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

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

Details of the format:

	Details
SOF	Start of the Frame. This value is always "0x02".
Command	Command Code Refer to: "The Camera Control Command"
Direction	"0": Reading or receiving data from the camera is always a "0" value. "1": Writing or sending data to the camera is always a "1" value. Note: This value is always "0" when the Camera responds.
Data length	This "Data Length" value tells how many bytes the "Data" will contain. The "Data Length" must be specified in bytes.
Data	This field is for option, set value and/or acquired value. The size must be specified as "Data Length".
Check sum	The "Check sum" functions to verify the integrity of the communication transmission. The "Check sum" value should equal the last (low) 8 bits of the summary of ["Command" + "Direction" + "Data Length" + "Data"]. If this value of "Check sum" does not match with last (low) 8 bits of the summary data of ["Command" + "Direction" + "Data Length" + "Data"], the camera will generate the error message: "Check Sum Error".
EOF	End of the Frame. This value is always "0x03".

Ryf-Nummer	Beschreibung
R-FHD-1080-1001	Digitale High Definition HD Video-Farbkamera in FHD 1080 P Video Standard, HDMI Stecker, robuste Bauweise für die Makroskopie und Mikroskopie, kein PC erforderlich, kompatibel mit Monitoren mit HDMI Schnittstelle.
R-HD-720-1003	Kabelgebundene Fernbedienung für OSD-Menü zu R-FHD-1080-1001.
R-HD-720-1004	Stecker-Netzgerät 100-240VAC/12VDC mit Hohlstecker zu R-FHD-1080-1001.