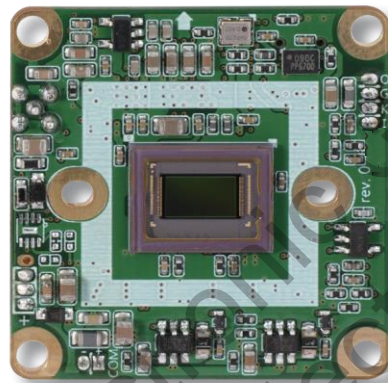


202-ESHSAHCV-662-xyzq

EX-SDI / HD-SDI Full-HD Board Camera



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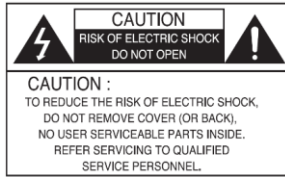
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- **Read instructions before operating the camera.**
- Please read/follow all instructions and read all warnings before operating the camera.
- Installation and servicing should only be done by Qualified Service and Installation Personnel.
- Installation shall be done in accordance with all local and national electrical and mechanical codes.
- Avoid mounting in direct sunlight.
- To reduce the risk of fire or electric shock, do not expose this appliance to rain, water or wet locations.
- If the camera is to be mounted outdoors a secondary waterproof enclosure should be used.


2.1 Precautions

- Do not put objects inside the unit. Make sure that no metal objects or flammable substances get inside the camera. It could cause fire, short-circuits or damages.
- Be careful when handling the unit.
- To prevent damage, do not drop the camera or subject it to strong shock or vibration.
- Install away from electric or magnetic fields.
- Protect it from humidity and dust.
- Protect from high temperature.
- Be careful when installing it close to the ceiling, in a kitchen or boiler room, as the temperature may raise to high levels.
- Cleaning - Dirt can be removed from the cabinet only by wiping it with a soft cloth moistened with a soft detergent solution.
- Mounting Surface - The mounting surface material must be strong enough to secure the camera.
- Avoid viewing a very bright object (such as light fittings) during an extended period.

2.2 Care of the Unit

- Remove dust or dirt on the surface of the lens with a blower (commercially available).
- Avoid the use of volatile solvents such as thinners, alcohol, benzene and insecticides. They may damage the surface finish and/or impair the operation of the camera.
- Be careful not to spill water or other liquids on the unit.

2.3 Operating and Storage Location

- Consult the datasheet of the camera for temperature limits and guidance.
- Avoid damp or dusty places.
- Avoid places exposed to rain.
- Avoid places subject to strong vibration.
- Avoid places close to generators of powerful electromagnetic radiation such as radio or TV transmitters.
-  If the product is to be put out of operation definitively, take it to a local recycling plant for disposal which is not harmful to the environment.

3. Document History

Document History

Revision	Issue Date	Reason
Rev A	10/23/2024	Initial Release
Rev B	01/23/2025	Section 6.10.2 FRAME RATE : Added 24p for 1920x1080

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5. Description

This document describes the specification and the usage guide for this camera.

5.1 Features

- Sony STARVIS-2 image sensor with significantly improved its dynamic range compared to conventional sensors
- Up-to-date CLEAR HDR technology for improving HDR image clarity, motion artifacts and chromatic aberration compared to DOL HDR
- Various Dynamic Range enhancements of image by Clear HDR, Digital Overlap HDR(DOL), INTER-FRAME HDR and DWDR
- Very Fast Adaptation to light changes by boosting the shutter response
- Superb low light performance by STARVIS-2 technology
- Sense-up by DSS(Digital Slow Shutter)
- ePTZ, smooth digital zooming, panning and tilting
- 3D noise reduction
- Multi video output formats 1080i/60, 1080p/30, Scaled 720p/60 or 30
- CVBS output at 4:3 or 16:9 aspect ratio
- Digital Video Outputs : HD-SDI/EX-SDI(1.0/2.0) selectable
- Analogue Video outputs : HD-Analogues(THD/AHD/CHD)/CVBS selectable
- Long-distance digital video transmission using EX-SDI2.0 visually lossless compression technology
- No-latency video transmission unlike IP network products
- UTC(Up-The-Coax) remote control on HD analogues over coaxial cable (Requires matching with DVR protocol)
- VISCA remote control via RS-485
- DC12V power input with reversed polarity protection
- NDAA Compliant

5.2 Dimensions

(unit : mm)

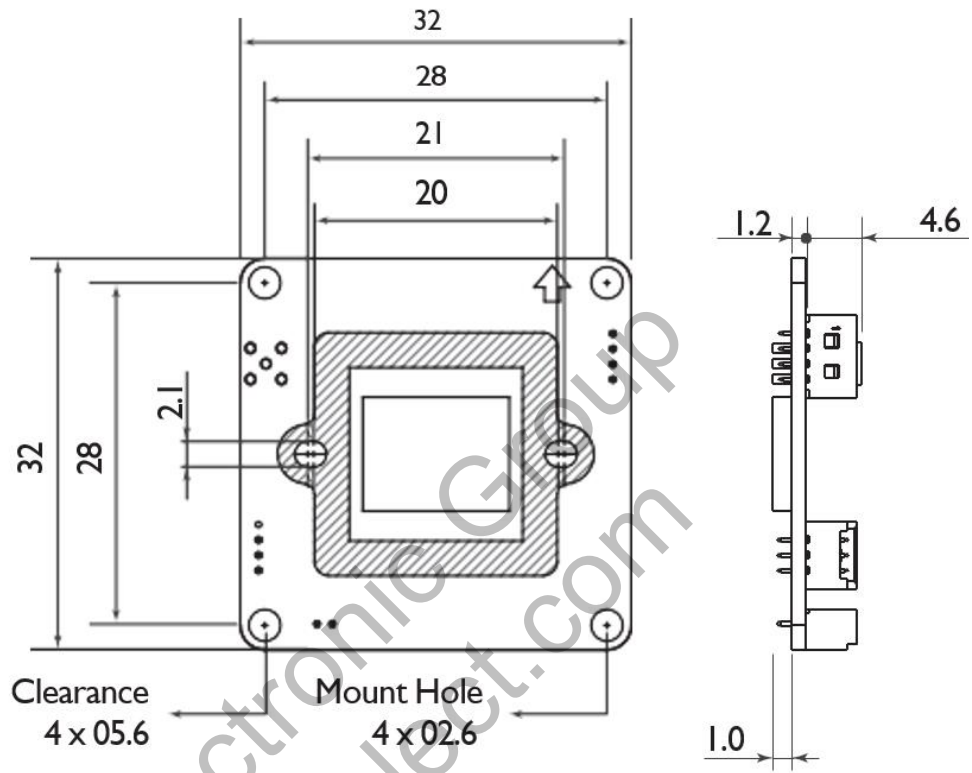


Figure 1. Dimensions

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6. Operating Instructions

6.1 SETUP MENU Table

Camera setup menu can be accessed and controlled by the optional OSD controller.

- EXIT : Selects 'EXIT' menu with save current setting or without save.
- RETURN : Returns to the previous menu.

LENS	DC	MODE (INDOOOR, OUTDOOR, DEBLUR)		
	MANUAL			
FOCUS ASSIST	ON, OFF			
EXPOSURE	BRIGHTNESS	0~20		
	SHUTTER	AUTO	NORMAL, DEBLUR	
		MANUAL (SPEED)	1/30, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/8000, 1/5000, 1/30000	
		FLICKERLESS		
	SENS-UP	OFF, x2, x4, x8, x16, x32		
AGC	0~10			
BACKLIGHT	OFF			
	HLC	LEVEL, COLOR		
	BLC	H/V-POS, H/V-SIZE		
	HDR	HDR	HDR	CLEAR HDR, INTER - FRAME, DOL
		HDR MODE	ROI	BOX(WINDOW, BOUNDARY, H/V-POS, H/V-SIZE) POLYGON (WINDOW, BOUNDARY, POS0-X, POS0-Y, POS1-X, POS1-Y, POS2-X, POS2-Y, POS3-X, POS3-Y)
	WEIGHT	LOW, MIDDLE, HIGH		
DAY & NIGHT	DAY			
	NIGHT	IRLED, ANTI-SAT.		
	AUTO	ANTI-SAT., D/N THRES, DELAY		
COLOR	WHITE BAL	AUTO, AUTOext, PRESET, MANUAL (C-TEMP, R/B-GAIN)		
	COLOR GAIN	0~20		
3D-NR	OFF, LOW, MIDDLE, HIGH			
IMAGE	SHARPNESS	0~10		
	GAMMA	0.45, 0.5, 0.55, 0.6, 0.65, 0.7, 0.75		
	MIRROR	OFF, ON		
	FLIP	OFF, ON		
	D-WDR	LOW, MIDDLE, HIGH, OFF		

IMAGE	DEFOG	OFF, ON	MODE (AUTO, MANUAL) LEVEL (LOW, MIDDLE, HIGH)
	SHADING	OFF, ON	WEIGHT(0~100%)
	DZOOM MODE	ePTZ, DZOOM	
	PRIVACY	OFF ON	BOX
POLYGON			ZONE NUM, ZONE DISP OFF/ON, POS0-X, POS0-Y, POS1-X, POS1-Y, POS2-Z, POS2-Y, POS3-X, POS3-Y, Y LEVEL, CB/CR LEVEL, TRAN
MOTION	OFF, ON	DET WINDOW	WINDOW NUM , BOUNDARY, DET H/V-POS, DET H/V-SIZE
		SENSITIVITY	0~10
		MOTION OSD	OFF, ON
		TEXT ALARM	OFF, ON
SYSTEM	OUTPUT	SDI OUTPUT	HD-SDI, EX-SDI 1.0, EX-SDI 2.0, OFF
		ANALOG OUT0	AHD , CHD, THD, CVBS
	FRAME RATE	1080 60i, 1080 30P, 720 60P(SCALE DOWN), 720 30P	
	TV SYSTEM	US(NTSC) / EU(PAL) switchable	
	CVBS FORMAT	4:3,16:9	
	LANGUAGE	ENG, CHN(S), CHN, JPN, KOR, GER	
	CAM TITLE	OFF, RIGHT UP, LEFT DOWN	
	COMM	CAM ID(0~255) BAUD RATE(2400, 4800, 9600, 57600, 115200)	
EXIT	FACTORY RESET	OFF, DONE	
	SAVE, CANCEL		

Table 1. Setup Menu table

6.2 SETUP MENU

MENU V0. xx	
1. LENS	MANUAL
2. FOCUS ASSIST	OFF
3. EXPOSURE	↓
4. BACKLIGHT	OFF
5. DAY&NIGHT	DAY
6. COLOR	↓
7. 3D-NR	MIDDLE
8. IMAGE	↓
9. MOTION	OFF
10.SYSTEM	↓
11.EXIT	SAVE

Figure 2. Setup Menu

6.2.1 Lens (Default Manual)

LENS must be selected, either DC or MANUAL lens according to lens type.

- **Manual**
Selects MANUAL when a fixed aperture lens is mounted.
- **DC** (This feature does not work due to hardware limitations on this product.)
Selects DC when an auto-iris lens is mounted.
- **INDOOR**: Optimized for indoors by weighting the shutter speed range to accommodate low light conditions.
- **OUTDOOR**: Optimized for outdoors by weighting the shutter speed range in response to bright light.
- **DEBLUR**: Improves motion blur that may occur due to slow shutter speeds indoors. Band noise may occur under lighting such as fluorescent lights.

6.2.2 FOCUS ASSIST

FOCUS ASSIST feature helps get the sharp focus of lens.

The focus is best when the yellow marker(zebra pattern) appears at its largest around the object's outline. Set to OFF for normal use.

6.3 EXPOSURE

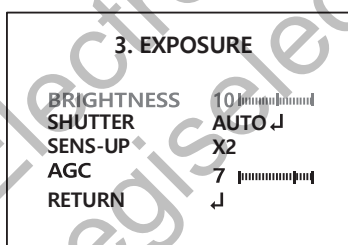


Figure 3. Exposure

6.3.1 BRIGHTNESS

Higher (lower) values brighten (darken) the image. (0~20).

6.3.2 SHUTTER

Selects AUTO or set MANUAL

If SHUTTER set to MANUAL modes, SENS-UP mode is inactivated.

- **AUTO**: Automatically controls shutter speed to obtain appropriate image level depending on lighting level.
- **MANUAL** : Selects a shutter speed out of 1/30, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/8000, 1/15000, 1/30000. Auto-iris lens needs to be essentially used.
- **FLICKERLESS** : Removes flickering in video caused by differences in TV mode and electrical frequency. (e.g., NTSC at 50Hz site or PAL at 60Hz site)

6.3.3 SENS-UP

SENS-UP feature employs Digital Slow Shutter technology to obtain brighter images in very dark environments. SENS-UP rate can be set to Off, x2, x4, x8, x16 or x32, with higher rate resulting in brighter images but slower refresh rates and blurrier images. The set SENS-UP value stands for the maximum SENS-UP rate that can be reached when it is at its darkest, and SENS-UP rate varies automatically within the set SENS-UP depending on the light level.

6.3.4 AGC

The set AGC value stands for the amplifier's maximum gain that can be reached when it is at its darkest, and the gain varies automatically within the set AGC depending on the light level. Overall noise level increases by higher AGC.

6.4 BACKLIGHT

Compensates the video image by one out of HLC, BLC or HDR.

6.4.1 HLC (High Light Compensation)



Figure 4. High Light Compensation

- LEVEL (0~20): Sets the threshold level of video to be cut and masked.
- COLOR : Sets the mask color out of Black, White, Yellow, Cyan, Green, Magenta, Red, Blue and Customize.

6.4.2 BLC (Backlight Compensation)

BLC brightens the objects under the back-lit environments.

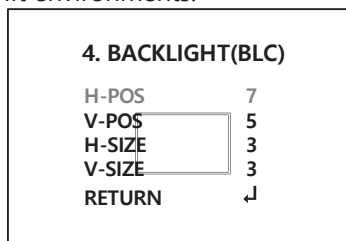


Figure 5. Back Light Compensation

- H-POS, V-POS :
Sets the start position of BLC window.
- H-SIZE, V-SIZE :
Sets the size of BLC window.

6.4.3 HDR

HDR improves the dynamic range of images in various ways.

4. BACKLIGHT(HDR)	
HDR MODE	CLEAR HDR
ROI MODE	OFF
WEIGHT	MIDDLE
RETURN	↓

Figure 6. High Dynamic Range

HDR MODE

Selects how to improve the dynamic range of an image using HDR. Either the entire image by HDR or the specific area by ROI.

Four HDR modes of CLEAR HDR, DOL, INTER-FRAME or ROI are available.

- CLEAR HDR : Sony's latest HDR for Starvis2 sensor delivers vivid, clean, natural images with reduced motion artifacts and chromatic aberration. CLEAR HDR captures a single image with high shutter speed and creates the 2nd image with the gain amplification and synthesizes them to generate CLEAR HDR image.
- DOL : Image sensor operates at double the speed, capturing images at long and short shutter speeds and synthesizing them to create HDR image. Long /short shutter speeds are determined by the image sensor.
- INTER-FRAME : ISP controls the image sensor to capture images at long and shutter speeds and synthesizes them to create HDR images. Long /short shutter speeds are controlled by ISP.
- ROI (Region of Interest) : Up to 4 ROI windows are available. Image levels in windows are controlled with the different shutter speeds from the background image.

WEIGHT

Sets the weight for the dynamic range.

6.5 DAY & NIGHT

MENU V0. xx	
1. LENS	MANUAL
2. FOCUS ASSIST	OFF
3. EXPOSURE	↓
4. BACKLIGHT	OFF
5. DAY&NIGHT	DAY
6. COLOR	↓
7. 3D-NR	MIDDLE
8. IMAGE	↓
9. MOTION	OFF
10.SYSTEM	↓
11.EXIT	SAVE

Figure 7. Day & Night

DAY

Forcibly set to DAY. No transition to NIGHT

NIGHT

Forcibly set to NIGHT. No transition to DAY.

AUTO

Determines DAY or NIGHT by light level through the lens and DAY from/to NIGHT is switched automatically according to the light level.

- IR-LED ANTI-SAT. : Increasing IR-LED ANTI-SAT reduces the white clipping of images of objects close to light sources like LEDs, but darkens the background.
- D=>N THRES : Sets the threshold level for transitioning from DAY to NIGHT. N=>D THRES : Sets the threshold level for transitioning from NIGHT to DAY.
- DELAY : Increasing DELAY reduces unwanted switching caused by short-term lights, such as those from passing cars.

5.DAY & NIGHT(AUTO)	
IR-LED ANTI-SAT.	10
D=>N THRES	13
N=>D THRES	7
DELAY	MIDDLE
RETURN	↓

Figure 8. Day & Night (Auto)

6.6 COLOR

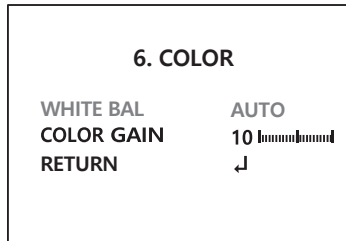


Figure 9. Color

6.6.1 WHITE BALANCE

Selects how WHITE BALANCE works out of AUTO, AUTOext, PRESET and MANUAL.

- AUTO : Generally useable for most applications with tracking the white balance automatically.
- AUTOext : Covers a wider color temperature range than AUTO.
- PRESET : White balance is updated only at the time when SET PRESET turns ON.
- MANUAL : White balance is adjusted by C-TEMP or R/B-GAIN.

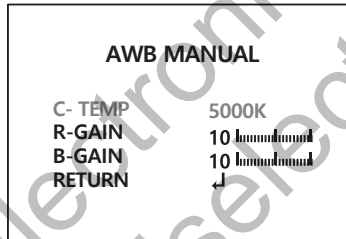


Figure 10. AWB Manual

6.6.2 COLOR GAIN

Increases or decreases the color gain, 0~20.

6.7 3D-NR (Digital Noise Reduction)

3D-NR effectively reduces noise in a temporal manner over multiple frames. This can reduce noise further by increasing depth, but it gets more motion blurry artifact for moving objects.

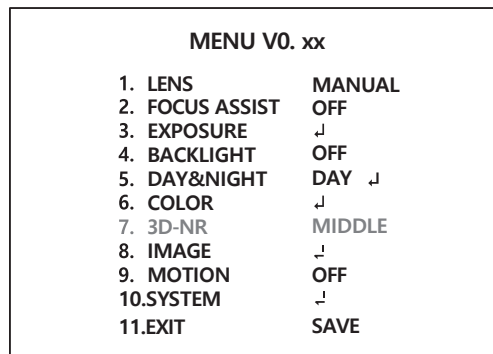


Figure 11. 3D-NR (Digital Noise Reduction)

6.8 IMAGE

8. IMAGE	
SHARPNESS	5
GAMMA	0.55
MIRROR	OFF
FLIP	OFF
D-WDR	OFF
DEFOG	OFF
SHADING	OFF
ZOOM MODE	DZOOM
DZOOM	1.0x
PRIVACY	↓
RETURN	↓

Figure 12. Image

6.8.1 SHARPNESS

Increases or decreases the sharpness of image.
Higher sharpness results in a coarser image and more noise.

6.8.2 GAMMA

Adjusts gamma level of video.

6.8.3 MIRROR

Flips the image horizontally left and right.

6.8.4 FLIP

Flips the image vertically.

6.8.5 D-WDR

Compensates image brighter for the dark area.

6.8.6 DEFOG

Enhances the foggy image for better visibility.

MODE :

- AUTO : Compensates image automatically according to status of scene.
- MANUAL : Sets the compensation level fixed.
- LEVEL : Sets the degree of the compensation.

6.8.7 SHADING

Compensates image at the corners for even brightness across the screen.

6.8.8 ZOOM MODE

Select ZOOM MODE to DZOOM or ePTZ.

DZOOM is a zoom that is digitally magnified and fixed its ratio.

ePTZ allows digital zooming, panning and tilting by remote via RS-485. VISCA command set is provided on request.

6.8.9 PRIVACY

16 privacy masks are available, and each one is programmable in size, color, position and transparency. The privacy mask can be set in the form of a box or polygon.







BOX		POLYGON	
WINDOW NUM.	0	WINDOW NUM.	0
BOUNDARY	OFF	BOUNDARY	OFF
H-POS	12	POS0-X	80
V-POS	2	POS0-Y	5
H-SIZE	3	POS1-X	88
V-SIZE	3	POS1-Y	5
Y LEVEL	10 	POS2-X	88
CB LEVEL	10 	POS2-Y	13
CR LEVEL	10 	POS3-X	80
TRANS	0	POS3-Y	13
RETURN	↵	Y LEVEL	10 
		CB LEVEL	10 
		CR LEVEL	10 
		TRANS	2
		RETURN	↵

Figure 13. Privacy (BOX & POLYGON)

BOX & POLYGON

- WINDOW NUM : Selects the privacy mask number to be adjusted.
- BOUNDARY : Turns the selected mask ON or OFF.
- H-POS, V-POS : Sets the H, V start coordinates of BOX mask area.
- POS0(X,Y) ~ POS3(X,Y) : Sets the X,Y coordinates of the corners of each POLYGON mask area.
- H-SIZE, V-SIZE : Sets the mask size of BOX mask area.
- Y LEVEL : Sets the bright level of the mask.
- CB LEVEL : Sets the mask color with the blue component.
- CR LEVEL : Sets the mask color with the red component.
- TRANS.: Selects transparency.
 - 0 : Not transparent.
 - 1 : 25% transparent.
 - 2 : 50% transparent.
 - 3 : 75% transparent.

6.9 MOTION DETECTION

4 motion detection windows are available and displays the results in blocks and/or a text message.


9. MOTION		DET WINDOW	
DET WINDOW	↵	WINDOW NUM.	0
SENSITIVITY	5 	BOUNDARY	ON
MOTION OSD	OFF	DET H-POS	1
TEXT ALARM	OFF	DET V-POS	1
RETURN	↵	DET H-SIZE	58
		DET V-SIZE	32
		RETURN	↵

Figure 14. Motion Detection

6.9.1 DET WINDOW

Sets the window for MOTION DETECTION.

- WINDOW NUM. : Selects the window number.
- BOUNDARY : Turns the selected mask ON or OFF.
- DET H-POS, DET V-POS : Sets the H, V start coordinates
- DET H-SIZE, DET V-SIZE : Sets the detection window sizes in H & V.

6.9.2 SENSITIVITY

Sets the detection sensitivity for motion (0~10).

The higher the value, the higher the sensitivity, but even small changes such as tree leaves shaking or lighting level changes can lead to error detection.

6.9.3 MOTION OSD

Sets ON or OFF to display the motion results in blocks.

6.9.4 TEXT ALARM

Displays a text message ' MOTION DETECTED!!'.

6.10 SYSTEM

Sets the system related functions.

10.SYSTEM	
OUTPUT	↓
FRAME RATE	1080 30
TV SYSTEM	US(NTSC)
CVBS FORMAT	4:3
LANGUAGE	ENG
CAM TITLE	OFF
COMM	↓
FACTORY RESET	ON
RETURN	↓

Figure 15. SYSTEM

6.10.1 OUTPUT

Sets the output video types.

- SDI OUTPUT : Selects the digital video output out of HD-SDI, EX-SDI1.0, EX-SDI2.0 or OFF.
- ANALOG MODE : Selects the analog video type out of AHD, THD, CHD or CVBS.

OUTPUT	
SDI OUTPUT	HD-SDI
ANALOG MODE	THD/CVBS-SUB
RETURN	↓

Figure 16. Output

6.10.2 FRAME RATE

Sets the output video resolutions out of 1080 60i or 1080 30p, 24p for 1920x1080, 720 60p or 720 30p for 1280x720 are available.

6.10.3 TV SYSTEM

Sets TV SYSTEM to US(NTSC) in 60Hz area or EU(PAL) in 50HZ area.

6.10.4 CVBS FORMAT

Sets the aspect ratio of CVBS out of 16:9 or 4:3

6.10.5 LANGUAGE

6 languages are available for OSD menu.
English, Korean, Japanese, Chinese(S), Chinese, German.

6.10.6 CAM TITLE

Camera title can be alphanumeric, and its display location can be selected out of OFF, RIGHT UP or LEFT DOWN.

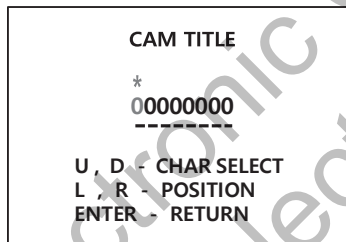


Figure 17. Cam Title

6.10.7 COMM

Sets the ID and the RS-485 speed. (Default is ID: 1, 9600BPS)

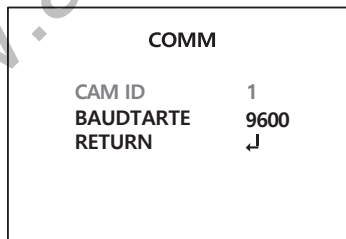


Figure 18. Comm

6.10.8 FACTORY RESET

Loading Factory Default.

6.11 EXIT

Exits SETUP MENU and returns to the normal display.

6.11.1 SAVE

Save all the settings and exit the setup menu.

6.11.2 CANCEL

Exit the setup menu without save.

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7. Specifications

Image Sensor/ISP		IMX-662, 1/2.8" SONY STARVIS-2 CMOS Sensor / EyeNix EN-781
Effective Pixels		1965 (H) x 1113 (V) = approx. 2.18 MP
Video Resolution	HD	1920x1080i 60/50 fps, 1920x1080p 30/25 fps, Scaled 1280x720p 60/50 fps or 30/25 fps
	CVBS	720x480i 60 fps, 720x576i 50 fps, 16:9/4:3 ratio
Min. Illumination		0.04 lux @ Color
Video Output	Digital (note1)	HD-SDI @1.485Gbps, non-compressed EX-SDI 2.0@135Mbps, EX-SDI 1.0@270Mbps, visually lossless compressed
	Analog	THD, AHD, CHD (compatible to HDTVI, AHD, HDCVI) @1Vpp unbalanced CVBS @1Vpp unbalanced
HDR		Clear HDR, Digital Overlap(DOL) HDR, INTER - FRAME
D-WDR		LOW, MIDDLE, HIGH, OFF
Shutter speed		1/30 ~ 1/30000 fps
DSS(Digital Slow Shutter)		Yes, 2x~32x
Day/Night		Color/B&W/Auto
White Balance		Auto/Auto-Ext/Preset/Manual
Noise Reduction		3D-MR / 2D-NR
Motion detection		Yes
Defog		ON/OFF
BLC/HLC		ON/OFF
Digital Zoom		Yes
ePTZ		Yes
Privacy Mask		Yes
Extra CVBS output		Yes
Image Orientation		Normal, H-Mirror, V-Upside Down
Remote Control	UTC	Up-The-Coax over coaxial video cable from Digital Video Recorder (note2)
	RS-485	Yes, VISCA protocol
Dimensions / Weight		32 mm(W) x 32 mm(D) x 6.8 mm(H) / 6 g
NDAA Compliant		Yes

note 1) Digital outputs, HD-SDI/EX-SDI, are disabled when CVBS is selected to use.

note 2) UTC requires matching with DVR protocol and remote distance is dependent on video cable length.

Table 2. Specifications

8. VISCA Command List

No	Group	Item	Command Packet	Comments
1	CAM_WB	ATW	81 01 04 35 00 FF	Auto Tracking White Balance
		One Push AWB Mode	81 01 04 35 03 FF	One Push WB Mode
		One Push AWB Trigger	81 01 04 10 05 FF	Triggers One Push WB
		ATW-ext	81 01 04 35 04 FF	Auto Tracking WB Extended
		Manual	81 01 04 35 05 FF	Manual WB Mode
2	CAM_Rgain	Reset	81 01 04 03 00 FF	Returns Rgain to default
		Up	81 01 04 03 02 FF	Increases Rgain
		Down	81 01 04 03 03 FF	Decreases Rgain
		Direct	81 01 04 43 00 00 0p 0q FF	p,q : R Gain (0x0 ~ 0x14)
3	CAM_Bgain	Reset	81 01 04 04 00 FF	Returns Bgain to default
		Up	81 01 04 04 02 FF	Increases Bgain
		Down	81 01 04 04 03 FF	Decreases Bgain
		Direct	81 01 04 44 00 00 0p 0q FF	p,q : B Gain (0x0 ~ 0x14)
4	CAM_AE	Full Auto	81 01 04 39 00 FF	Auto exposure mode
		Manual	81 01 04 39 03 FF	Manual Control Mode
		Flickerless	81 01 04 39 02 FF	Flickerless Mode
5	CAM_SHUTTER_AUTO	NORMAL	81 01 04 3A 02 FF	Auto exposure NORMAL
		DEBLUR	81 01 04 3A 03 FF	Auto exposure Deblur
6	CAM_Max Sens-Up	Direct	81 01 04 5A 10 00 00 0p FF	p: Max SlowShutter((SENS-UP) (0 :OFF, 1: x2, 2: x4, 3: x8, 4: x16, 5: x32)
7	CAM_Shutter_Speed	Reset	81 01 04 0A 00 FF	Returns SHUTTER to default
		Up	81 01 04 0A 02 FF	Increases Shutter position
		Down	81 01 04 0A 03 FF	Decreases Shutter position
		Direct	81 01 04 4A 00 00 00 0p FF	p : Shutter position (00 ~ 0A) 00:1/25(30), 01:1/50(60), 02:1/100(120), 03:1/200(240) 04:1/400(500), 05:1/800(1000), 06:1/1600(2000), 07:1/3200(4000) 08:1/6400(8000), 09:12800(15,000), 0A :1/25,600(30,000)
8	CAM_AGC_Limit	Reset	81 01 04 0C 00 FF	Returns AGC Limit to default

		Up	81 01 04 0C 02 FF	Increases AGC Limit
		Down	81 01 04 0C 03 FF	Decreases AGC Limit
		Direct	81 01 04 4C 00 00 0p 0q FF	p,q : AGC Limit setting (0x0 ~ 0xA)
9	CAM_Bright	Reset	81 01 04 0D 00 FF	Returns Bright to default
		Up	81 01 04 0D 02 FF	Increases Bright
		Down	81 01 04 0D 03 FF	Decreases Bright
		Direct	81 01 04 4D 00 00 0p 0q FF	p,q : Bright (0x0 ~ 0x14)
10	CAM_BackLight	On	81 01 04 33 02 FF	Back Light Compensation
		Off	81 01 04 33 03 FF	
11	CAM_BLCFunc	Area OSD Display ON	81 01 04 3C 01 FF	BackLight Window ON/OFF
		Area OSD Display OFF	81 01 04 3C 00 FF	
		START H position	81 01 04 3C 10 00 0p 0q FF	pp: 0~13 Start of window's H- position
		START V position	81 01 04 3C 20 00 0p 0q FF	pp: 0~13 Start of window's V- position
		END H size	81 01 04 3C 30 00 0p 0q FF	pp: 0~13 End of window's H- size
		END V size	81 01 04 3C 40 00 0p 0q FF	pp: 0~13 End of window's V- size
12	CAM_HLC	Mode	81 01 04 32 0p FF	p: HLC Mode - 0: Off, 1: On
		Level	81 01 04 32 10 00 0p 0q FF	p,q: HLC Level - 0 to 14
		Color	81 01 04 32 20 00 00 0p FF	p: HLC Clip Level - 0~ 7
13	CAM_HDR		81 01 04 3D 0p FF	HDR ON/OFF p: 0-CLR HDR, 1-DO , 2-FRAME , 3:OFF
14	CAM_HDR_Level	Direct	81 01 04 7D 0p FF	p: HDR Level - 0~2 (low,middle,high)
15	CAM_3DNR	Mode	81 01 04 53 0p FF	p: 0-off, 1-Low, 2-Middle, 3-High
16	CAM_Gamma		81 01 04 5B 0p FF	p: Gamma setting (5~A) (5:0.45, 6:0.5, 7:0.55, 8:0.6, 9:0.65 , A: 0.7 , B:0.75)
17	CAM_Defog	On_Manual	81 01 04 37 02 FF	Defog On/Off
		On_AUTO	81 01 04 37 04 FF	
		Off	81 01 04 37 03 FF	
18	CAM_Defog_Level	LOW	81 01 04 38 05 FF	Defog Level
		MID	81 01 04 38 06 FF	
		HIGH	81 01 04 38 07 FF	
19	CAM_D-WDR	OFF	81 01 04 1A 00 FF	D-wdr OFF
		LOW	81 01 04 1A 01 FF	D-wdr LOW
		MIDDLE	81 01 04 1A 02 FF	D-wdr MIDDLE

		HIGH	81 01 04 1A 03 FF	D-wdr HIGH
20	CAM_Sharpness	Reset	81 01 04 02 00 FF	Returns Sharpness to default
		Up	81 01 04 02 02 FF	Increases Sharpness
		Down	81 01 04 02 03 FF	Decreases Sharpness
		Direct	81 01 04 42 00 00 00 0p FF	p: Sharpness (0x0 ~ 0xA)
21	CAM_LR_Reverse	On	81 01 04 61 02 FF	Horizontal Reverse On/Off
		Off	81 01 04 61 03 FF	
22	CAM_Vert. Flip	On	81 01 04 66 02 FF	Vert. Flip On/Off
		Off	81 01 04 66 03 FF	
23	CAM_DN_Auto	Mode	81 01 04 51 0p FF	p: day/night mode (2:Auto, 3:Color, 4:B/w)
		Auto D->N Threshold	81 01 04 21 00 00 0p 0q FF	p,q: D->N Threshold level (0x0 ~ 0x14)
		Auto N->D Threshold	81 01 04 21 10 00 0p 0q FF	p,q: N->D Threshold level (0x0 ~ 0x14)
		Auto ICR Delay	81 01 04 21 20 0P FF	p: Transition DELAY - 0~ 2 (low,middle,high)
24	CAM_ColorGain	Direct	81 01 04 49 00 00 0p 0q FF	p,q: color gain ((0x0 ~ 0x14)
25	CAM_PrivacyZone	off	81 01 04 7C 03 FF	Privacy Window OFF
		on	81 01 04 7C 04 FF	Privacy Window ON
26	CAM_MEMSave	Save	81 01 04 23 02 FF	Saves Menu settings
27	CAM_OUTFormat_CVBS	4:3	81 01 04 24 73 00 05 FF	CVBS 4:3 format
		16:9	81 01 04 24 73 00 06 FF	CVBS 16:9 format
28	CAM_OUTFormat_HD	HD-sdi	81 01 04 24 74 00 07 FF	Selects HD-sdi
		EX-sdi	81 01 04 24 74 00 08 FF	Selects EX-sdi
29	CAM_Resolution_Frame rate	1080p / 25	81 01 04 24 72 00 08 FF	1080p / 25
		1080p / 30	81 01 04 24 72 00 06 FF	1080p / 30
		720p / 25	81 01 04 24 72 01 01 FF	720p / 25
		720p / 30	81 01 04 24 72 00 0E FF	720p / 30
		720p / 50	81 01 04 24 72 00 0C FF	720p / 50
		720p / 60	81 01 04 24 72 00 09 FF	720p / 60
		1080i / 50	81 01 04 24 72 00 04 FF	1080i / 50

		1080i / 60	81 01 04 24 72 00 01 FF	1080i / 60
30	CAM_CUSTOM	Factory Reset	81 01 04 3F 00 7F FF	Load Factory Default
31	CAM_MENUKey	Up	81 01 04 16 01 FF	Moves UP
		Down	81 01 04 16 02 FF	Moves DOWN
		Left	81 01 04 16 04 FF	Moves LEFT
		Right	81 01 04 16 08 FF	Moves RIGHT
		Menu	81 01 04 16 10 FF	Enters MENU
		Menu Exit	81 01 04 16 20 FF	Exits MENU
32	VISCA Baudrate	2400bps	81 01 04 24 01 02 00 FF	Sets Baudrate to 2400bps
		4800bps	81 01 04 24 01 02 01 FF	Sets Baudrate to 4800bps
		9600bps	81 01 04 24 01 02 02 FF	Sets Baudrate to 9600bps (Default)
		57600bps	81 01 04 24 01 02 03 FF	Sets Baudrate to 57600bps
		115200bps	81 01 04 24 01 02 04 FF	Sets Baudrate to 115200bps
33	ePTZ ZOOM	UP (TELE)	81 01 04 17 00 01 FF	Starts Zoom IN
		DN (WIDE)	81 01 04 17 00 02 FF	Starts Zoom OUT
		ZOOM STOP	81 01 04 17 02 00 FF	Ends ZOOM
		ALL Clear	81 01 04 17 00 20 FF	d-zoom / Cursor clear
34	ePTZ PAN/TILT	Left/UP	81 01 04 17 01 05 FF	Moves to TOP LEFT
		Left/DOWN	81 01 04 17 01 06 FF	Moves to BOTTOM LEFT
		Right/UP	81 01 04 17 01 09 FF	Moves to TOP RIGHT
		Right/DOWN	81 01 04 17 01 0A FF	Moves to BOTTOM RIGHT
		UP	81 01 04 17 01 01 FF	Moves UP
		DOWN	81 01 04 17 01 02 FF	Moves DOWN
		LEFT	81 01 04 17 01 04 FF	Moves LEFT
		RIGHT	81 01 04 17 01 08 FF	Moves RIGHT
		P/T end	81 01 04 17 03 00 FF	Ends PAN/TILT
Return	81 01 04 17 01 10 FF	Returns to Origin state		
35	Direct Dzoom	Direct_DZOOM_ratio	81 01 04 46 00 0p 0q Or FF	p,q,r: D-Zoom magnification ratio (x1.0 ~x 33.0) 0,1,0(x1.0), 0,1,1(x1.1), 0,1,2(x1.2), 0,1,3(x1.3)..... 0,2,0(x2.0), 3,2,0(x32.0)
36	D-ZOOM_XY	XY Coordinates	81 01 04 47 00 0p 0q Or 0s FF	p,q: X coordinate (1,2,3,4,5,6,7,8,9,A,B,C,D,E,F,11,12, 13) r,s: Y coordinate (

				1,2,3,4,5,6,7,8,9,A,B,C,D,E,F,11,12,13)
37	CAM_Title_ID_ZOOM	On	81 01 04 47 2p FF	Title , ID, Zoom ratio display on/off p: 1-title-right up, 2-ID-leftup, 3-Zoom ratio -right down, 4- title-left down
		Off	81 01 04 47 3p FF	
38	ZOOM SPEED		81 01 04 17 04 0p FF	p : 1 to 7 speed
39	PAN/TILT SPEED		81 01 04 17 05 0p FF	p : 1 to 7 speed

Table 3. Visca command list

1. OK Reply : CAM ID :1
 90 41 FF (Execution of received command)
 90 51 FF (Execution is completed)
2. ERROR Reply :
 90 61 41 FF (Command not executable)
 90 61 01 FF (Message length error)
 90 61 02 FF (Syntax error)
 90 61 04 FF (Command cancelled)

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9. Contact Information

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