

Zoom Camera Module

Technical Manual



CM8236G

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Features

- This camera uses a 1 / 1.8" Sony IMX265 CMOS image sensor (approx. 2 million effective pixels) that supports Full HD (high definition) to produce high-quality images.
- Using progressive scan, images with a wide dynamic range can be obtained with the newly developed image signal processor (Digital Wide Dynamic Range function). Furthermore, it is possible to automatically switch to this Wide Dynamic Range function, which enables you to obtain optimal images ranging from the dark areas of a subject to the light areas.
- The camera is equipped with a bright zoom lens with x36 optical zoom and F1.6 aperture (optical zoom * digital zoom = x432).
- Low-noise images can be obtained even in low-light environments using the 3D Noise Reduction function.
- Video signals can be output as digital outputs. Depending on register settings, you can select from a variety of digital output methods : 1080p30/1080p25 (LVDS/SDI Model)
- An infrared (IR) Cut-Filter can be disengaged from the image path for increased sensitivity in low light environments. The ICR will automatically engage depending on the ambient light, allowing the camera to be effective in day/night environment.
- VISCA, Pelco D/P is a communications protocol, which enables the camera to be controlled remotely from a host computer/controller.
- A Privacy Zone Masking function (max. 8 blocks) is available.
- A Motion Detection function is available.

Precautions

Power Supply

Do not apply excessive voltage. (Use only the specified voltage.) Otherwise, you may get an electric shock or a fire may occur.

This Camera was designed a 9V to 15V DC. In case of abnormal operation, contact your authorized store where you purchased the product.

Operation

Start the camera control software on your computer after you turn on the camera and the image is displayed.

Operation and storage locations

Do not shoot images that are extremely bright (e.g., light sources, the sun, etc.) for long periods of time. Do not use or store the camera in the following extreme conditions:

- Extremely hot or cold places (operating temperature -10°C to $+50^{\circ}\text{C}$)
- Close to generators of powerful electromagnetic radiation such as radio or TV transmitters
- Where it is subject to fluorescent light reflections
- Where it is subject to unstable (flickering, etc.) lighting conditions
- Where it is subject to strong vibration
- Where it is subject to radiation from laser beams

Care of the unit

Remove dust or dirt on the surface of the lens with a blower (commercially available).

Other

Be careful not to spill water or other liquids on the unit.

Phenomena specific to CMOS image sensors

The following phenomena that may appear in images are specific to CMOS (complementary metal-oxide semiconductor) image sensors. They do not indicate malfunctions.

White flecks

Although the CMOS image sensors are produced with high-precision technologies, fine white flecks may be generated on the screen in rare cases, caused by cosmic rays, etc. This is related to the principle of CMOS image sensors and is not a malfunction.

The white flecks especially tend to be seen in the following cases:

- when operating at a high environmental temperature
- when you have raised the master gain (sensitivity)
- when operating in Slow-Shutter mode

Aliasing

When fine patterns, stripes, or lines are shot, they may appear jagged or flicker.

Phenomena Specific to Lenses Ghosting

If a strong light source (e.g., the sun) exists near the incidence angle of the lens, bright spots may appear in the image due to diffuse reflection within the lens.

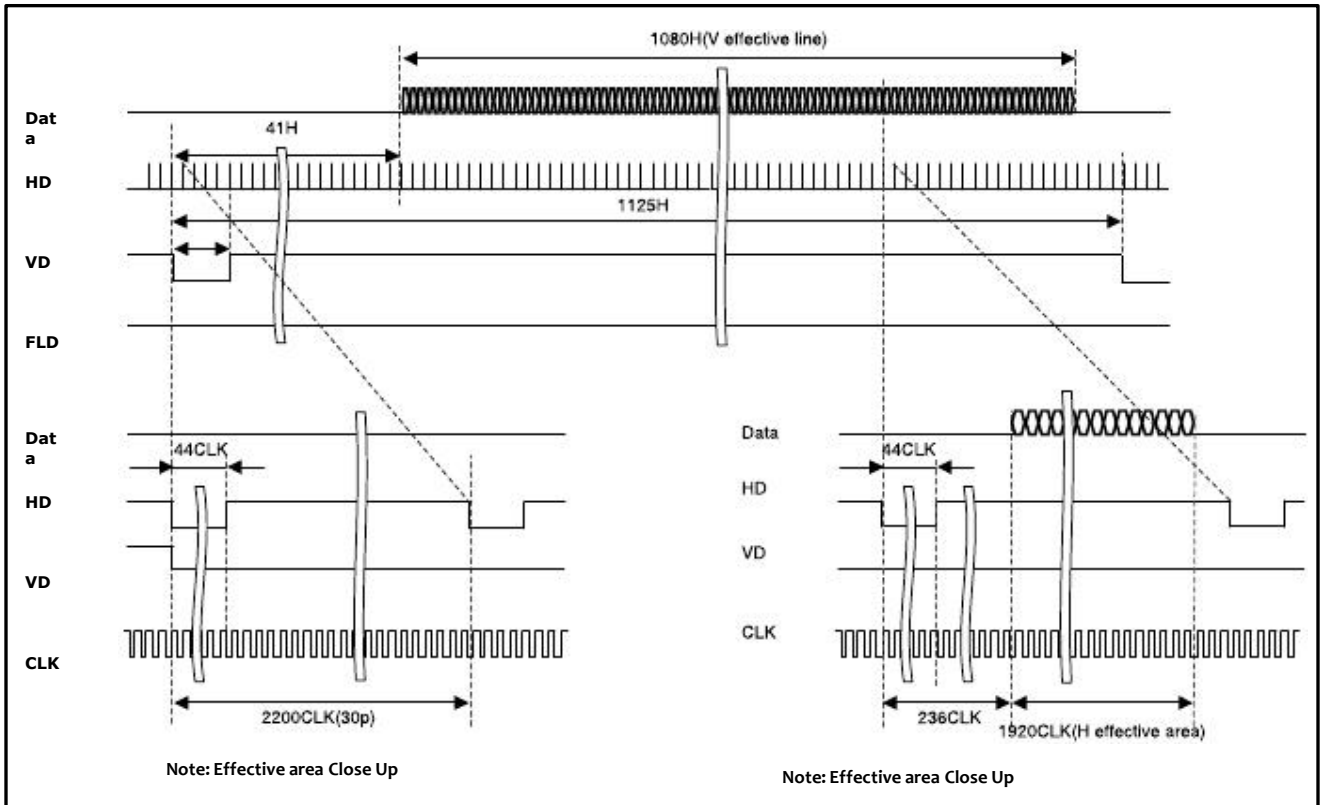
Specifications

A. GENERAL

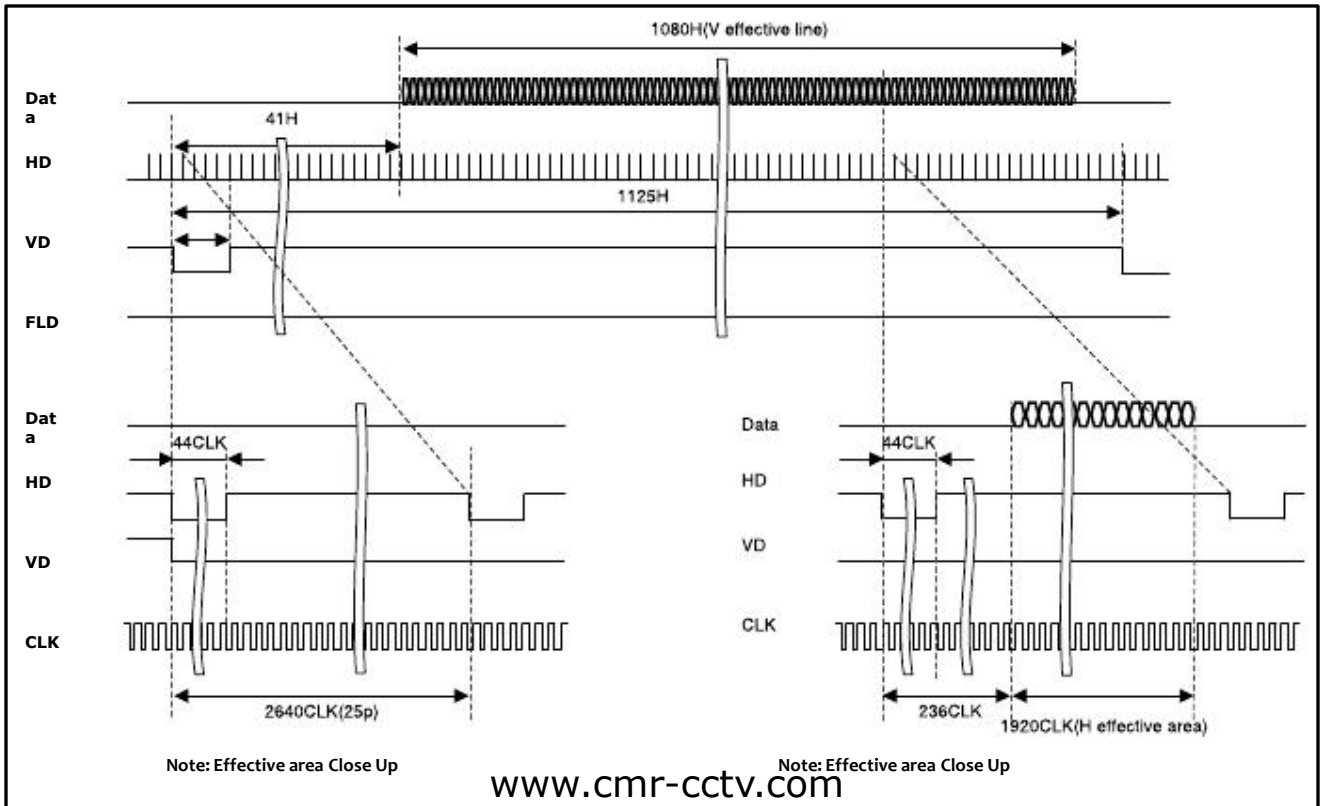
Features	Descriptions
Image Sensor	1 / 1.8" Type Sony Global Shutter CMOS Sensor
Active pixels	1,920(H) x 1,080(V), 2.1M Pixels
Sync. System	Internal
Resolution	LVDS Only : 1920x1080p(60/50, 30/25fps), Digital + HD-SDI : 1920x1080(30/25fps), Analog : 700TVL(without WDR function)
Min. illumination	Color : 0.15 lux , BW : 0.01 lux DSS Color : 0.0375 lux , IR Mode : 0 lux
Video Output	HD : Digital(LVDS) / HDSDI Analog SD : CVBS(without WDR)
LENS	
Lens Type	x36 Day & Night Zoom Lens
Zoom Ratio	Optical x36, Digital x12
Focal Length	f = 6.0 mm ~ 216.0 mm
Aperture Ratio	F1.6 (wide) ~ F5.3 (tele)
Angle of view	Approx. 60 degrees (WIDE end), Approx. 2 degrees (TELE end)
Min. Working Distance	100 mm (WIDE end), 1500 mm (TELE end)
Function	
Focus Mode	Auto / Manual / One Push
Zoom Mode	Combine / Separate
Zoom Track	OFF / Auto / Manual
Zoom Speed	0 to 7
Lens Refresh	OFF / Auto[1 Day to 7 Day] / Push
AE MODE	AUTO / / MANUAL / SHUT PRIORITY / IRIS PRIORITY / BRIGHT
AGC LIMIT	OFF / 0 ~ 15
DSS	OFF / x2(Default) to x32

Features	Descriptions
White Balance	AWB / ATW[INDOOR / OUTDOOR] / MANUAL / PUSH / ANTI-ROLLING
Color Temp	2,000K to 8,500K[ATW], 1,800K to 16,500K[Anti Rolling]
ATW	INDOOR / OUTDOOR
MANUAL	RED GAIN/BLUE GAIN Adjustable
DAY & NIGHT	AUTO / DAY / NIGHT / CDS / EXT-H / EXT-L
Change Level	0 to 10
Delay Time	1 Sec to 10 Min
Image	Sharpness / Chrome/ Hue / Flip / Freeze / De-Fog / Gamma
Flip	OFF / H / V / H-V Flip
Freeze	ON / OFF
Shading	ON / OFF
Gamma	LCD / CRT / User[0.45 to 0.8]
Backlight	OFF / BLC / WDR / HLC
BLC	LOW / MIDDLE / HIGH
WDR	LOW / MIDDLE / HIGH
HLC	0 to 100
DNR	0 to 5
MOTION DET	ON (4 Zone)/ OFF
PRIVACY	OFF / ON[8 Zone]
DEFOG	OFF / 1 - 3
Protocol	Pelco D/P, VISCA
Cam ID	0 to 255
Baud Rate	2,400 to 115,200
Language	ENGLISH/CHINESE
Operating Voltage	9 to 15V DC
Power Consumption	Max. 5W (at 12V DC)
Storage Temperature	-20°C ~ +60°C (Humidity : 20%RH ~ 95%RH)
Operating Temperature	-10°C ~ +50°C (Humidity : 20%RH ~ 80%RH)

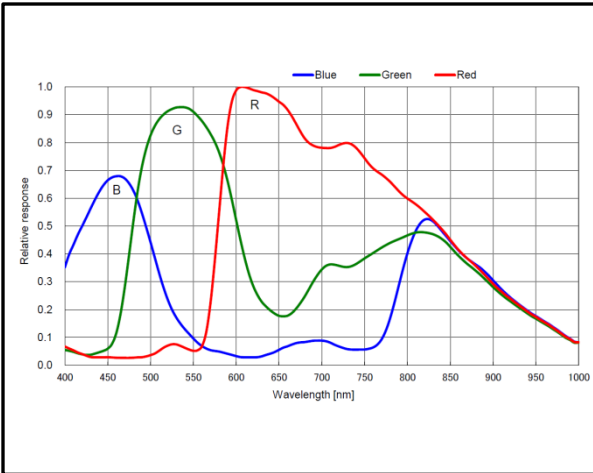
1080p/30 Output Timing Chart



1080p/25 Output Timing Chart



Spectral Sensitivity Characteristics

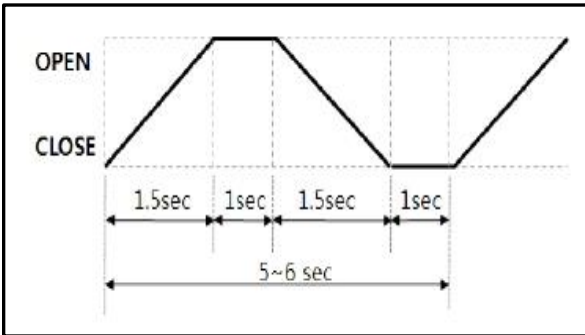


Reliability and Environment Condition

IRIS

50,000 times (Room Temperature)

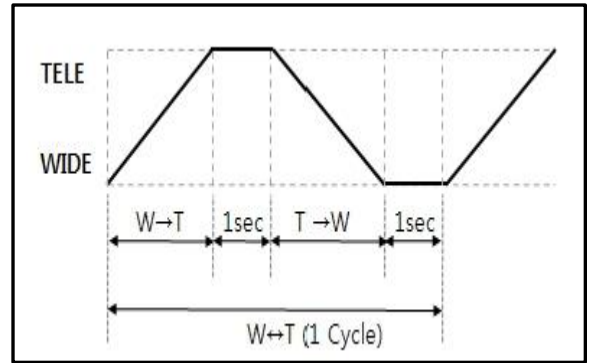
- The change of Iris's speed or the failure of the Iris's operation should not happen when the Iris's operation is tested for the 50,000 times from CLOSE to OPEN.
- A time's cycle is 5sec ~ 6sec.



ZOOM

500,000 times

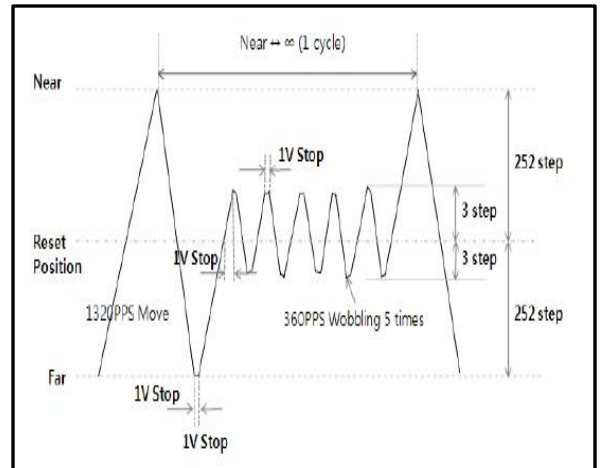
- The failure of Zooming operation should not happen when Zooming is tested for the 500,000 times from TELE to WIDE.
- The step between TELE and WIDE is 1614 (Half Step)
- The test should be done by the following speed condition.



Focus

500,000 times

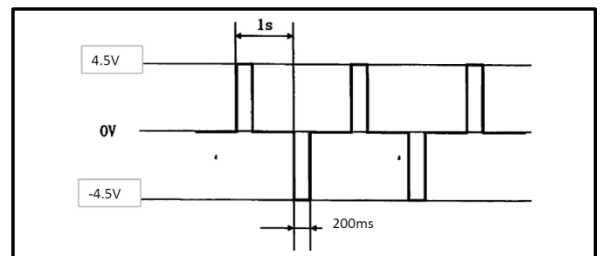
- The failure of Focusing operation should not happen when Focusing is tested by the following cycle for the 500,000 times.



Day & Night

50,000 times

- The failure of DAY & NIGHT operation should not happen when the function of the DAY & NIGHT is tested by the following cycle for the 50,000 times.
- Motor Voltage = 5V

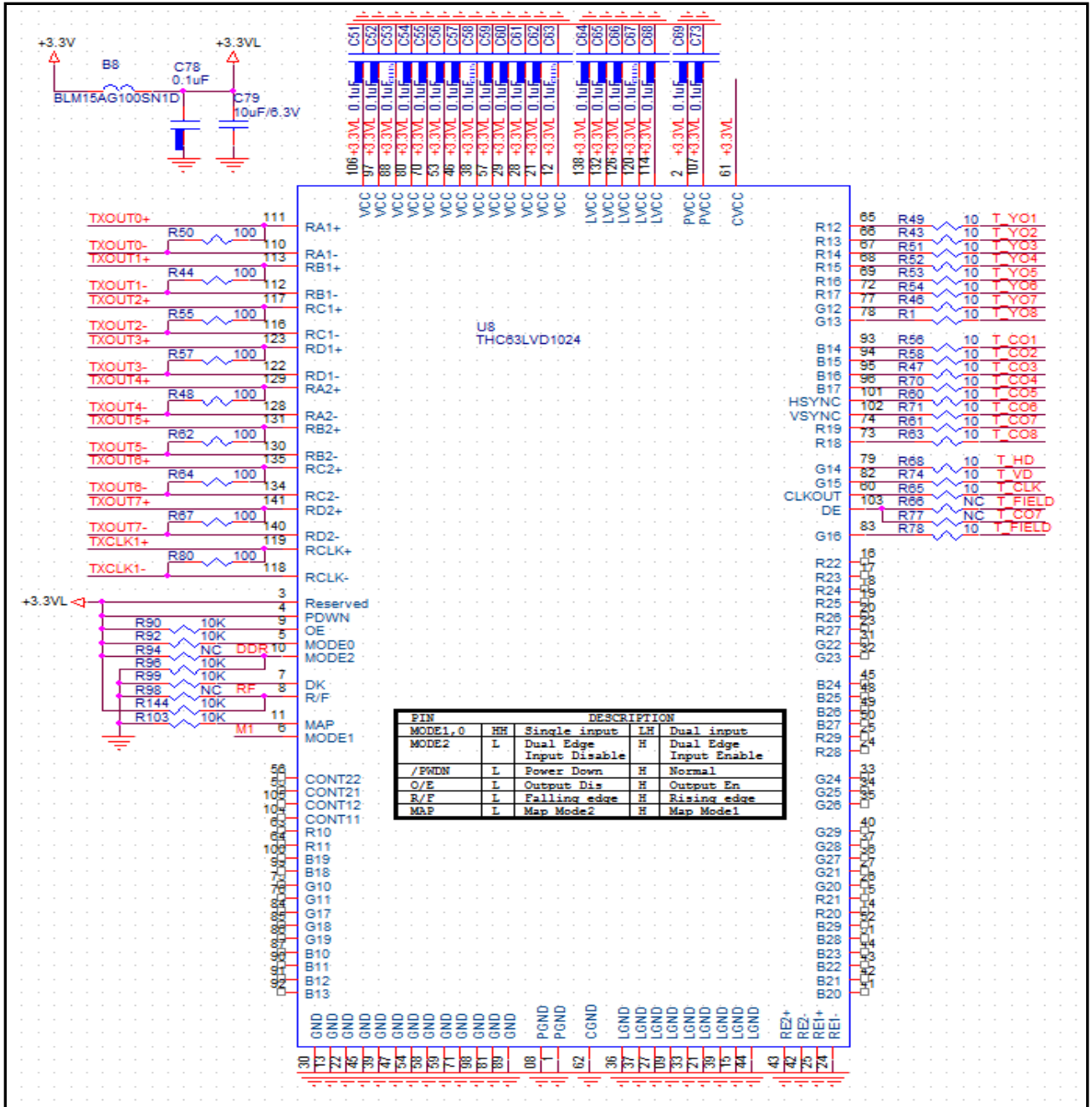


Pin Description (LVDS Model)

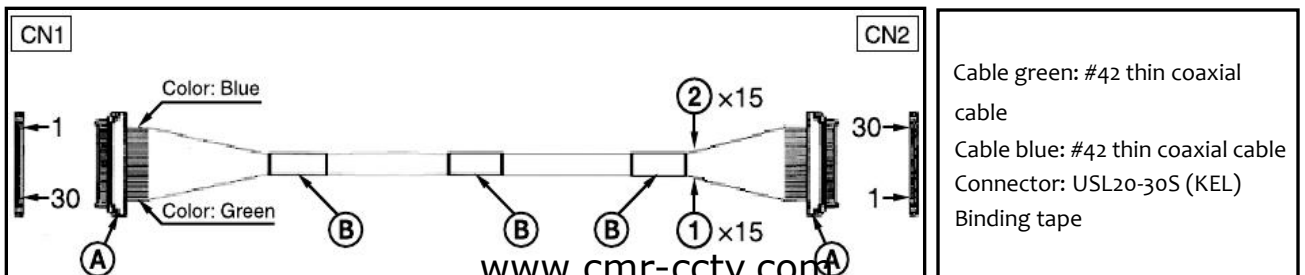
Part No - J203

Pin No	Pin Name	Description	Remark
1	TXOUT3+	LVDS TXOUT3+	
2	TXOUT3-	LVDS TXOUT3-	
3	TXCLK+	LVDS TXCLK+	
4	TXCLK-	LVDS TXCLK-	
5	TXOUT2+	LVDS TXOUT2+	
6	TXOUT2-	LVDS TXOUT2-	
7	TXOUT1+	LVDS TXOUT1+	
8	TXOUT1-	LVDS TXOUT1-	
9	TXOUT0+	LVDS TXOUT0+	
10	TXOUT0-	LVDS TXOUT0-	
11	GND	GND	
12	TXD	UART TXD	OUT
13	RXD	UART RXD	IN
14	DC_IN	DC Power input	9 ~ 15V
15	DC_IN	DC Power input	9 ~ 15V
16	DC_IN	DC Power input	9 ~ 15V
17	DC_IN	DC Power input	9 ~ 15V
18	DC_IN	DC Power input	9 ~ 15V
19	GND	GND	
20	GND	GND	
21	TXOUT7+	LVDS TXOUT7+	
22	TXOUT7-	LVDS TXOUT7-	
23	TXOUT6+	LVDS TXOUT6+	
24	TXOUT6-	LVDS TXOUT6-	
25	NC		
26	NC		
27	TXOUT5+	LVDS TXOUT5+	
28	TXOUT5-	LVDS TXOUT5-	
29	TXOUT4+	LVDS TXOUT4+	
30	TXOUT4-	LVDS TXOUT4-	

LVDS Example Circuit



Cable reference specifications (crossover)



LVDS receiver IC (example:THC63LVD1024C)

Pin assignment POWER PART

Pin No.	Description	Signal	Pin No.	Description	Signal
106	VCC	+3.3V	81	GND	
97	VCC	+3.3V	89	GND	
88	VCC	+3.3V	108	PGND	
80	VCC	+3.3V	1	PGND	
70	VCC	+3.3V	62	CGND	
53	VCC	+3.3V	136	GND	
46	VCC	+3.3V	137	GND	
38	VCC	+3.3V	127	GND	
57	VCC	+3.3V	109	GND	
29	VCC	+3.3V	133	GND	
28	VCC	+3.3V	121	GND	
21	VCC	+3.3V	139	GND	
12	VCC	+3.3V	115	GND	
138	LVCC	+3.3V	144	GND	
132	LVCC	+3.3V	RE2+	GND	
126	LVCC	+3.3V	RE2-	GND	
120	LVCC	+3.3V	RE1+	GND	
114	LVCC	+3.3V	RE1-	GND	
107	PVCC	+3.3V			
2	PVCC	+3.3V			
61	CVCC	+3.3V			
30	GND				
13	GND				
22	GND				
145	GND				
39	GND				
47	GND				
54	GND				
58	GND				
59	GND				
71	GND				
98	GND				

LVDS receiver IC (example:THC63LVD1024C)

Pin assignment SIGNAL PART

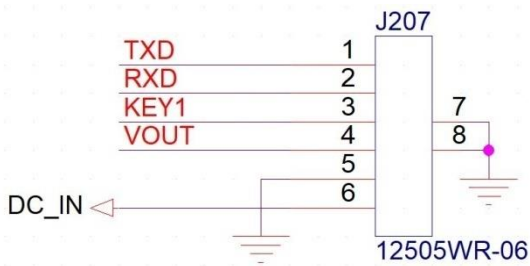
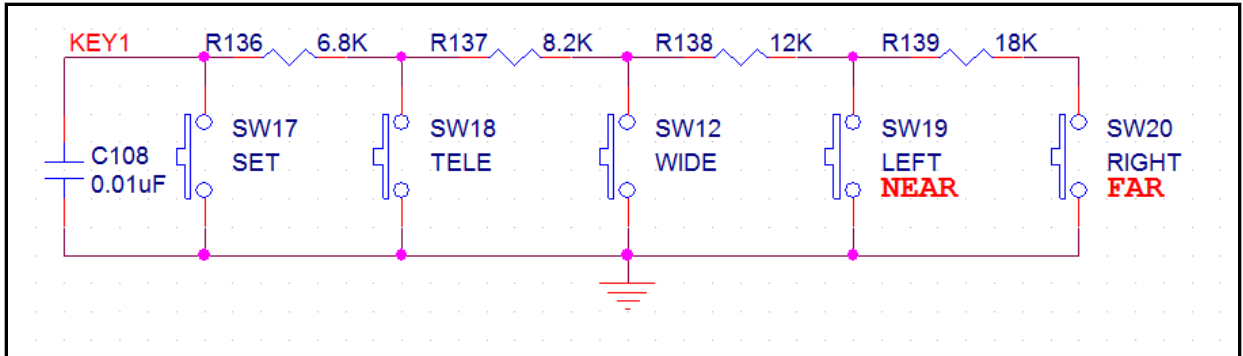
Pin No.	Description	Signal	Pin No.	Description	Signal
111	TXOUT0+	LVDS IN	65	Y01	Y1 OUTPUT
110	TXOUT0-	LVDS IN	66	Y02	Y2 OUTPUT
113	TXOUT1+	LVDS IN	67	Y03	Y3 OUTPUT
112	TXOUT1-	LVDS IN	68	Y04	Y4 OUTPUT
117	TXOUT2+	LVDS IN	69	Y05	Y5 OUTPUT
116	TXOUT2-	LVDS IN	72	Y06	Y6 OUTPUT
123	TXOUT3+	LVDS IN	77	Y07	Y7 OUTPUT
122	TXOUT3-	LVDS IN	78	Y08	Y8 OUTPUT
129	TXOUT4+	LVDS IN	93	C01	C1 OUTPUT
128	TXOUT4-	LVDS IN	94	C02	C2 OUTPUT
131	TXOUT5+	LVDS IN	95	C03	C3 OUTPUT
130	TXOUT5-	LVDS IN	96	C04	C4 OUTPUT
135	TXOUT6+	LVDS IN	101	C05	C5 OUTPUT
134	TXOUT6-	LVDS IN	102	C06	C6 OUTPUT
141	TXOUT7+	LVDS IN	74	C07	C7 OUTPUT
140	TXOUT7-	LVDS IN	73	C08	C8 OUTPUT
119	TXCLK1+	LVDS IN	79	T_HD	HSYNC OUTPUT
118	TXCLK1-	LVDS IN	82	T_VD	VSYNC OUTPUT
3	RESERVED	+3.3V	60	T_CLK	PCLK OUTPUT
4	PDWN	+3.3V	103		
9	OE	+3.3V PULL UP	83	T_FIELD	FIELD OUTPUT
5	MODE0				
10	MODE2				
7	DK	GND PULL DOWN			
8	R/F				
11	MAP	GND PULL DOWN			
6	MODE1				
Mode Setting					
Pin Name	Level	Description	Level	Description	Remark
MODE 1 / 0	H/H	SINGLE INPUT	L/H	DUAL INPUT	
MODE 2	L	DUAL EDGE INPUT DISABLE	H	DUAL EDGE INPUT ENABLE	
OE	L	OUTPUT DISABLE	H	OUTPUT ENABLE	
R/F	L	FALLING EDGE	H	RISING EDGE	
MAP	L	MAP MODE2	H	MAP MODE1	

LVDS receiver IC (example:THC63LVD1024C) Pin assignment SIGNAL PART

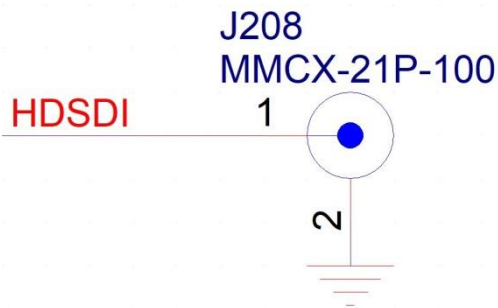
Pin No.	Description	Signal
111	TXOUT0+	LVDS IN
110	TXOUT0-	LVDS IN
113	TXOUT1+	LVDS IN
112	TXOUT1-	LVDS IN
117	TXOUT2+	LVDS IN
116	TXOUT2-	LVDS IN
123	TXOUT3+	LVDS IN
122	TXOUT3-	LVDS IN
129	TXOUT4+	LVDS IN
128	TXOUT4-	LVDS IN
131	TXOUT5+	LVDS IN
130	TXOUT5-	LVDS IN
135	TXOUT6+	LVDS IN
134	TXOUT6-	LVDS IN
141	TXOUT7+	LVDS IN
140	TXOUT7-	LVDS IN
119	TXCLK1+	LVDS IN
118	TXCLK1-	LVDS IN
3	RESERVED	+3.3V
4	PDWN	+3.3V
9	OE	+3.3V PULL UP
5	MODE0	
10	MODE2	
7	DK	GND PULL DOWN
8	R/F	
11	MAP	GND PULL DOWN
6	MODE1	
65	Y01	Y1 OUTPUT
66	Y02	Y2 OUTPUT
67	Y03	Y3 OUTPUT
68	Y04	Y4 OUTPUT
69	Y05	Y5 OUTPUT

Pin No.	Description	Signal	
72	Y06	Y6 OUTPUT	
77	Y07	Y7 OUTPUT	
78	Y08	Y8 OUTPUT	
93	C01	C1 OUTPUT	
94	C02	C2 OUTPUT	
95	C03	C3 OUTPUT	
96	C04	C4 OUTPUT	
101	C05	C5 OUTPUT	
102	C06	C6 OUTPUT	
74	C07	C7 OUTPUT	
73	C08	C8 OUTPUT	
79	T_HD	HSYNC OUTPUT	
82	T_VD	VSYNC OUTPUT	
60	T_CLK	PCLK OUTPUT	
103			
83	T_FIELD	FIELD OUTPUT	
Mode Setting			
Pin Name	Level	Description	Remark
MODE 1 / 0	H/H	SINGLE INPUT	
	L/H	DUAL INPUT	
MODE 2	L	DUAL EDGE INPUT DISABLE	
	H	DUAL EDGE INPUT ENABLE	
OE	L	OUTPUT DISABLE	
	H	OUTPUT ENABLE	
R/F	L	FALLING EDGE	
	H	RISING EDGE	
MAP	L	MAP MODE2	
	H	MAP MODE1	

USING AD KEY

















Pin No.	Pin Name	Description	Remark
1	TXD	UART TXD	OUT
2	RXD	UART RXD	IN
3	KEY1	ADKEY Input	IN
4	VOUT	CVBS	IN
5	GND	GND	
6	DC_IN	DC Power Input	9V~15V



Pin No.	Pin Name	Description	Remark
1	HDSDI	HD-SDI	IN
2	GND	GND	

OSD & Menu

1'ST ITEM	2'ND ITEM	3'RD ITEM or DATA	4'TH ITEM or DATA	5'TH ITEM or DATA
FOCUS	FOCUS MODE	PUSH AUTO	MANUAL/AUTO	
	AF MODE	NORMAL	INTERVAL/ZOOM TRIGGER	
	INTERVAL	—+— 5	0~255	
	DIST LIMIT	1.5M	50CM/10CM/30M/7M/3M	
	ZOOM MODE	COMBINE	SEPARATE	
	DZOOM MODE	OFF/ON	—+— X1.0	X1.0~X12.0
	ZOOM TRK MODE	AUTO	MANUAL	
	ZOOM SPEED	—+— 6	0~7	
	LENS REFRESH	OFF/PUSH/AUTO	DAY1	DAY1~DAY7
	INITIAL			
	RETURN			
EXPOSURE	BRIGHTNESS	—+— 50	0~100	
	AE MODE	AUTO	MANUAL/SHUT PRIORITY/ IRIS PRIORITY/BRIGHT	
	IRIS LEVEL	—+— 50	0~100	
	SHUT SPEED	1/30	X32,X16,X8,X4,X2,1/30,1/60,1/ 120,1/240,1/480,1/960,1/2000,1/ 5000,1/10000,1/15000,1/30000	
	GAIN LEVEL	—+— 0	0~100	
	BRIGHT LEVEL	—+— 18	0~33	
	AFLK	OFF/ON		
	AGC LIMIT	—+— 12	0~15	
	DSS LIMIT	X2	X2/X4/X8/X16/X32/OFF	
	BACKLIGHT	OFF	BLC/WDR/HLC	
	BLC&WDR LEVEL	LOW	MIDDLE/HIGH	
	HLC LEVEL	—+— 50	0~100	
	HLC COLOR	BLACK	WHITE/YELLOW/CYAN/GREEN/ MAGENTA/RED/BLUE	
	INITIAL			
	RETURN			
WHITE BALANCE	MODE	INDOOR	OUTDOOR/AWB/ANTI ROLLING	
	RED GAIN	—+— 50	0~100	
	BLUE GAIN	—+— 50	0~100	
	PUSH			
	COLOR TEMP	—+— 1930K	1930K~14900K	
	INITIAL			
	RETURN			
DAY&NIGHT	CHANGE LEVEL	—+— 5	0~10	
	SHUT SPEED	5SEC	10SEC/20SEC/30SEC/60SEC/ 10MIN/1SEC	
	INITIAL			
	RETURN			
IMAGE	ADJUST			
	BRIGHT	—+— 50	0~100	
	CONTRAST	—+— 50	0~100	

1'ST ITEM	2'ND ITEM	3'RD ITEM or DATA	4'TH ITEM or DATA	5'TH ITEM or DATA
IMAGE	SHARPNESS	 50	0~100	
	CHROMA	 50	0~100	
	HUE	 50	0~100	
	NEGA	OFF/ON		
	FLIP	OFF	H-FLIP/V-FLIP/VH-FLIP	
	FREEZE	OFF/ON		
	COLOR	ON/OFF		
	GAMMA	LCD	USER/CRT	
	USER	0.45	0.30~0.85	
	INITIAL			
	RETURN			
SPECIAL	MOTION	OFF/ON		
	ZONE	1	2/3/4	
	STATE	OFF/ON		
	X POS	 10	0~100	
	Y POS	 10	0~100	
	WIDTH	 25	0~100	
	HEIGHT	 25	0~100	
	DISPLAY	OFF	TEXT/IMG/ALL ON	
	SENSITIVITY	 0	0~20	
	RESET ZONE			
	PRIVACY	OFF/ON		
	ZONE	1	2/3/4/5/6/7/8	
	STATE	OFF/ON		
	X POS	 20	0~100	
	Y POS	 34	0~100	
	WIDTH	 10	0~100	
	HEIGHT	 10	0~100	
	COLOR	WHITE	YELLOW/CYAN/GREEN/ MAGENTA/RED/BLUE/BLACK	
	TRANS	100%	25%/50%/75%/100%	
	MASK CENTER			
	RESET ZONE			
	DNR	 3	0~5	
	DEFOG	 0	0~3	
	DIS	OFF/ON		
	INITIAL			
	RETURN			
	SYSTEM	CAMERA ID	1	0~255
CAMERA TITLE				
DISPLAY		OFF/ON		
CAMERA ID		OFF/ON		
CAMERA TITLE		OFF/ON		
ZOOM MAG		OFF/ON		
FUNCTION		OFF/ON		
LANGUAGE		ENG		
PROTOCOL		VISCA	VISCA/PELCO-D	
BAUD RATE		9600	2400/4800/19200/38400/ 57600/115200	
OUTPUT FORMAT		1080/30P	1080/50P,1080/60P,1080/25P	
VERSION		#### #.##		
FACTORY RESET		NO/YES		
REBOOT		SAVE YES/SAVE NO		
RETURN	EXIT SAVE YES/EXIT SAVE NO			
EXIT		SAVE YES/SAVE NO		

Basic Functions

Zoom

The CM8236G camera employs a x36 optical zoom Lens combined with a digital zoom function; this camera allows you to zoom up to x432.

- **Optical x36, f = 6 mm to 216 mm (F1.6 to F5.3)**

The horizontal angle of view is approximately 60 degrees (wide end) to 2 degrees (tele end).

Digital Zoom enlarges the center of the subject by expanding each image in both the vertical and horizontal directions.

When x360 zoom is used, the number of effective picture elements in each direction reduces to 1/8 and the overall resolution deteriorates.

You can activate the zoom in the following ways with a VISCA command.

Using Standard Mode

Using Variable Mode

There are eight levels of zoom speed.

Direct Mode

Setting the zoom position enables quick movement to the designated position.

Digital Zoom ON/OFF

In these standard and variable Speed Modes, it is necessary to send Stop Command to stop the zoom operation.

- The Zoom Mode supports a Combined Mode and a Separate Mode.

Combined Mode

This is the previously existing zoom method. After the optical zoom has reached its maximum level, the camera switches to Digital Zoom Mode.

Separate Mode

In this mode, Optical Zoom and Digital Zoom can be operated separately. You can use digital zoom magnification at any time from within any level of optical magnification.

About Continues Zoom position Reply

With ZoomDirect mode, or when zooming according to a preset, the camera outputs zoom position data when Continues Zoom position Reply is set to ON via a command.

Continues Zoom position Reply: y0 07 04
69 0p 0p 0q 0q 0q 0q FF
pp: D-Zoom position
qqqq: Zoom position

Focus

Focus has the following modes, all of which can be set Using VISCA Commands.

- **Auto Focus Mode**

The minimum focus distance is 100 mm at the optical wide end and 1000 mm at the optical tele end, and is independent of the digital zoom.

The Auto Focus (AF) function automatically adjusts the focus position to maximize the high frequency content of the picture in a center measurement area, taking into consideration the high luminance and strong contrast components.

- **Manual Focus Mode**

Manual Focus has both a Standard Speed Mode and a Variable Speed Mode. Standard Speed Mode focuses at a fixed rate of speed. Variable Speed Mode has eight speed levels that can be set using a VISCA Command. In these standard and variable Speed Modes, it is necessary to send Stop Command to stop the zoom operation.

- **One Push Mode**

When a One Push Command is sent, the lens moves to adjust the focus for the subject. The focus lens then holds that position until the next Trigger Command is input.

White Balance

White Balance has the following modes, all of which can be set using VISCA Commands.

- **Auto White Balance(AWB)**

This mode computes the white balance value output using color information from the entire screen. It outputs the proper value using the color temperature radiating from a black subject based on a range of values from 3000 to 7500K. This mode is the factory setting.

- **ATW**

Auto Tracing White balance (2000 to 8500K)

- **Indoor**

3200K Base Mode

- **Outdoor**

5800K Base Mode

- **One Push WB**

The One Push White Balance mode is a fixed white balance mode that may be automatically readjusted only at the request of the User(One Push Trigger), assuming that a white subject, in correct lighting conditions, and occupying more than 1/2 of the image, is submitted to the camera.

One Push White Balance data is lost when the power is turned off. If the power is turned off, reset One Push White Balance.

- **Manual WB**

Manual control of R and B gain, 100steps each.

- **Anti Rolling**

This is an auto white balance mode specifically for anti rolling environments.

Automatic Exposure Mode

A variety of AE functions are available for Optimal output of subjects in lighting conditions that range from low to high.

- **Full Auto** Auto Iris and Gain, Fixed Shutter Speed

- **Gain Limit Setting**

The gain limit can be set at the Full Auto, Shutter Priority, Iris Priority, Bright, and manual in the AE mode. Use this setting when image signal-to-noise ratio is particularly important.

- **Shutter Priority**

Variable Shutter Speed, Auto Iris and Gain (x32 to 1/30,000 sec., 11 high-speed shutter speeds plus 5 low-speed shutter speeds)
1) Flicker can be eliminated by setting shutter to 1/100s for NTSC models used in countries with a 50 Hz power supply frequency 1/120s for PAL models used in countries with a 60 Hz power supply frequency

- **Iris Priority**

Variable Iris (F1.6 to Close, 18 steps), Auto Gain and Shutter speed

- **Manual**

Variable Shutter, Iris and Gain

- **Bright**

Variable Iris and Gain (Close to F1.6, 17 steps at 0 dB: F1.6, 17 steps from 0 to 28dB)

AE – Shutter priority

The shutter speed can be set freely by the user to a total of 22 steps – 16 high speeds and 6 low speeds. When the slow shutter is set, the speed can be 1/30s, 1/15s, 1/8s, from the memory.

The memory is updated at a low rate from the CCD. AF capability is low.

In high speed mode, the shutter speed can be set up to 1/30,000s. The iris and gain are set automatically, according to the brightness of the subject.

Data	60/30mode	50/25mode
shutter speed table		
step(hex)	NTSC	PAL
0x0F	1/30000	1/30000
0x0E	1/15000	1/15000
0x0D	1/10000	1/10000
0x0C	1/5000	1/5000
0x0B	1/2000	1/2000
0x0A	1/960	1/800
0x09	1/480	1/400
0x08	1/240	1/200
0x07	1/100	1/120
0x06	1/60	1/50
0x05	1/30	1/25
0x04	X2	x2
0x03	x4	x4
0x02	x8	x8
0x01	x16	x16
0x00	x32	x32

AE – Iris priority

The iris can be set freely by the user to 18 steps between F1.6 and Close.

The gain and shutter speed are set automatically, according to the brightness of the subject.

Data	Setting value	Data	Setting value
0x11	OPEN	0x0A	
0x10		0x09	
0x0F		0x08	
0x0E		0x07	
0x0D		0x06	
0x0C		~	
0x0B		0x00	CLOSE

AE – Manual

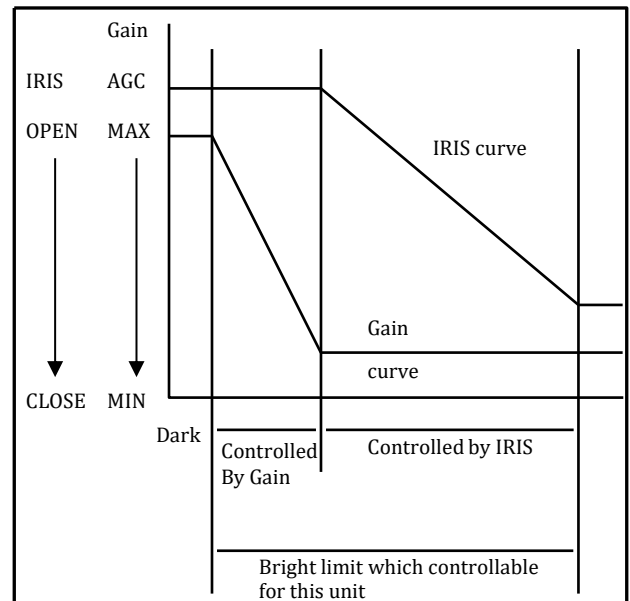
The shutter speed (16 steps), iris (18 steps) and gain (16 steps) can be set freely by the user.

AE – Bright

The bright control function adjusts both gain and iris using an internal algorithm, according to a brightness level freely set by the user. Exposure is controlled by gain when dark, and by iris when bright.

As both gain and iris are fixed, this mode is used when exposing at a fixed camera sensitivity. When switching from Full Auto or Shutter Priority Mode to Bright Mode, the current status will be retained for a short period of time.

Only when the AE mode is set to “Full Auto” or “Shutter Priority,” can you switch it to “Bright.”



Data	Iris	Gain	Data	Iris	Gain
0x1F	F1.6	28 dB	0x11	F1.6	0 dB
0x1E	F1.6	26 dB	0x10		0 dB
0x1D	F1.6	24 dB	0x0F		0 dB
0x1C	F1.6	22 dB	0x0E		0 dB
0x1B	F1.6	20 dB	0x0D		0 dB
0x1A	F1.6	18 dB	0x0C		0 dB
0x19	F1.6	16 dB	0x0B		0 dB
0x18	F1.6	14 dB	0x0A		0 dB
0x17	F1.6	12 dB	0x09		0 dB
0x16	F1.6	10 dB	0x08		0 dB
0x15	F1.6	8 dB	0x07		0 dB
0x14	F1.6	6 dB	0x06		0 dB
0x13	F1.6	4 dB	~		0 dB
0x12	F1.6	2 dB	0x00	CLOSE	0 dB

When switching from the Shutter Priority mode to the Bright mode, the shutter speed set in the Shutter Priority mode is maintained.

DAY & NIGHT

ICR (IR Cut-Removable)

An infrared (IR) Cut-Filter can be disengaged from the image path for increased sensitivity in low light environments. The ICR will automatically engage depending on the ambient light, allowing the camera to be effective in day/night environments.

When the auto ICR mode is set to ON, the image becomes black and white.

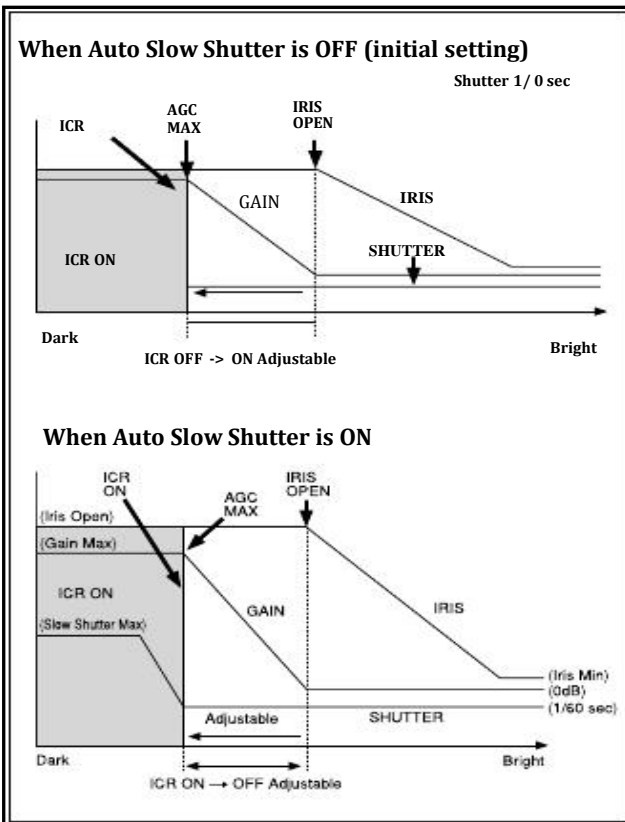
Auto Mode

Auto ICR Mode automatically switches the settings needed for attaching or removing the IR Cut Filter.

With a set level of darkness, the IR Cut Filter is automatically disabled (ICR ON), and the infrared sensitivity is increased.

With a set level of brightness, the IR Cut Filter is automatically enabled (ICR OFF). Also, on systems equipped with an IR light, the internal data of the camera is used to make the proper decisions to avoid malfunctions.

Auto ICR Mode operates with the AE Full Auto setting.



When in Auto_ICR_OFF state and WB data is added(default), a malfunction may occur when the subjects largely consisting of blue and green colors are taken.

DAY Mode

IR Cut Filter is always enabled. The image of camera is always color mode.

NIGHT Mode

IR Cut Filter is always disabled. The image of camera is always black & white mode.

EXT-H Mode

When external signal 'H' input, the camera mode will set night mode.

EXT-L Mode

When external signal 'L' input, the camera mode will set night mode.

Image

Image has the following modes, all of which can be set using VISCA Commands.

• **Sharpness**

Sharpness control is a function which adjusts the enhancement of the edges of objects in the picture.

There are 100 levels of adjustment, starting from "0"

When shooting text, this control may help by making them sharper.

• **Chroma**

A captured color image is converted to 256 levels of gray, and you can set a color to all levels brighter than the threshold value, and another color to all levels darker than the threshold value.

• **HUE**

You can customize and configure the color phase.

The initial setting 0 degrees (7h) is adjustable between approx. -14 degrees (0h) and +14 degrees (Eh), in 15 increments.

• **Flip**

- **E-FLIP(H/V/HV FLIP)**

This function turns the video output from the camera upside down.

- **Mirror Image**

This function reverses the video output from the camera horizontally.

• **Freeze**

This function captures an image in the field memory of the camera so that this image can be output continuously.

Because communication inside the camera is based on V cycle,

The captured image is always the one 3V to 4Vs after the sending of a Command. Thus, you can not specify a time period after sending EVEN, ODD or a Command.

• **Shading**

• **Gamma**

Gamma correction can be changed in this mode. The following three options are available.

1: LCD

2: CRT

3: User Gamma

- 0.3 to 0.85 adjustable

Blocked-up shadows in images will be more noticeable than usual.

Back Light Compensation

When the background of the subject is too bright, or when the subject is too dark due to shooting in the AE mode, back light compensation will make the subject appear clearer.

Back Light Compensation Mode

The Back Light Compensation can be set to be Low/Middle/High in accordance with the user selection.

Digital Wide Dynamic Range (WDR) Mode

The Wide Dynamic Range mode is a function for dividing an image into several blocks and correcting blocked-up shadows and blown-out highlights in accordance with the intensity difference. It enables you to obtain images in which portions ranging from dark to light can be recognized, even when capturing a subject with a large intensity difference that is backlit or includes extremely light portions.

Images with wide dynamic range are produced by combining long-exposure signals (normal shutter) with the signals of the high-intensity portions obtained with a short exposure (high-speed shutter).

Wide Dynamic Range Select Mode

The wide dynamic range can be set to be Low/Middle/High in accordance with the user selection.

High Light Masking Mode

Digital Noise Reduction

The DNR (Noise Reduction) function removes noise (both random and non-random) to provide clearer images. This function has four steps: 0 to 5. The DNR effect is applied in levels based on the gain, and this setting value determines the limit of the effect. In bright conditions, changing the DNR level will not have an effect.

Motion Detection Function

This function instructs the camera to detect movement within the monitoring area and then send an alarm signal automatically. The Detect signal goes out through the serial command (VISCA) communication line.

Features

- You can set a frame for the detection range of 4 zones.
- You can set up to four frames.
- When the motion is detected in the set frame, the Alarm Replay VISCA command is sent.
- The threshold level for detection can be set (common to four frames).
- The interval of alarm detection can be set up to 255 seconds in units of one second.
- You can set on/off for each frame.
- When the Block Mode is set to ON, the Alarm Replay command is not sent. Use this mode for checking when the camera is installed or for confirming the camera operation.
- The frame number is also sent with Alarm Replay to report in which frame the motion has been detected.

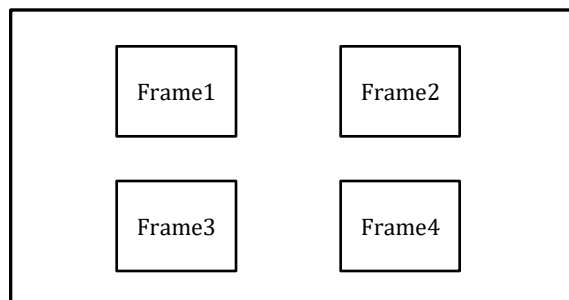
Frames

Setting frames

You can set the frame by assigning the starting point and terminating point vertically and horizontally. You can set up to four frames.

When motion is detected within the range where frames overlap

The alarms are sent for both frames.



Frame 1

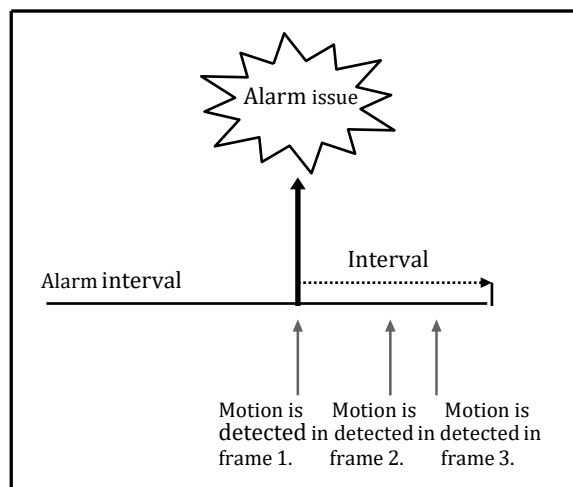
Frame 2

Frame 3

Frame 4

Sending Alarms

- When motion is detected, the Alarm Replay command is issued via the serial command (VISCA) communication line.
- When multiple motions are detected or motion is detected in another frame within the set interval following the original time the alarm was issued, another alarm command is not issued.
- When motion is detected after the interval time elapsed, the alarm is issued again.



Setting Commands

•MD On/Off

The Display mode is selected by the Function Set command and frames are set by the Frame Set command. By sending an MD On command, the frame is displayed when motion is detected in the set frame.

The Alarm Reply command is set via the serial command (VISCA) communication line.

8x 01 04 1B 02 FF --- On

8x 01 04 1B 03 FF --- Off

•Function Set

Select the detected frame, and set the Threshold Level and the Interval Time.

8x 01 04 1C 0m 0n 0p 0q 0r 0s FF

m: Display Mode on/off (bit0: Frame)

n: Detection Frame set on/off (bit0: Frame0, bit1: Frame1, bit2: Frame2, bit3: Frame3) ---

(0 to F)

pq: Threshold -- (00 to FF)

rs: Interval time set -- (00 to FF)

(When pq and rs are 0, the command is received, but the setting is disabled.)

•Frame Set

You can set up to four frames by assigning the starting and terminating points.

Set a terminating point higher vertically and horizontally than the starting point.

If you set the wrong value, the command yields an error.

8x 01 04 1D 0m 0p 0q rr 0s FF

m: Select Detection Frame (0: Frame0, 1: Frame1, 2: Frame2, 3: Frame3) -- (0, 1, 2, 3)

p: Frame set Start Horizontal Position -- (00 to 0F)

q: Frame set Start Vertical Position -- (00 to 07)

r: Frame set End Horizontal Position -- (01 to 10)

s: Frame set End Vertical Position -- (01 to 08)

•Alarm Reply

When motion is detected in the set frame, the camera issues this command. This command includes the information on the number of the detected frame.

y0 07 04 1B 0p FF

p: Frame Number (bit0: Frame0, bit1: Frame1, bit2: Frame2, bit3: Frame3)

Privacy Zone Masking Function

Privacy Zone masking protects private objects and areas such as house windows, entrances, and exits which are within the camera's range of vision but not subject to surveillance.

Privacy zone masking can be masked on the monitor to protect privacy.

Features

- Mask can be set on up to 8 places according to Pan/Tilt positions.
- Mask can be displayed on 8 places per screen simultaneously.
- Privacy Zones are displayed according to priority in alphabetical order.
- Individual on/off zone masking settings.
- Two colors can be individually set for each of 8 privacy zones.
- Interlocking control with zooming.
- Interlocking control with Pan/Tilt.

Privacy Zone Setting Command List

Command Set	Command	Command Packet	Comments
CAM_Privacy Zone	Set Mask	8x 01 04 76 mm nn 0r 0r 0s 0s FF	mm:1~8, nn:Not Use, rr:0~55, ss:0~40 SettingMask(Size) See “mm:Masksettinglist”, “nn:Setting”, and “rr:w, ss:h” in “Parameters” on page 17.
	Display	8x 01 04 77 pp pp pp pp FF	pppppppp:Maskbit(0~7) Setting Mask Display On/Off See “pppppppp:Maskbit” in “Parameters” on page 17. pppppppp:Mask setting(0:OFF,1:ON)
	SetMaskColor	8x 01 04 78 pp pp pp pp qq rr FF	pp:ColorsettingwhensettingtheMaskbitto0 rr:ColorsettingwhensettingtheMaskbitto1 qq:Not Use Setting Color of Mask See “pppppppp:Maskbit” and “qq,rr:Color code” in “Parameters” on page 17. qq:ColorsettingwhensettingtheMaskbitto0 rr:ColorsettingwhensettingtheMaskbitto1
	SetPanTiltAngle	8x 01 04 79 0p 0p 0p 0q 0q 0q FF	Pan:0000~0800, 0800~0FFE Tilt:0000~0400, 0C00~0FFE Setting Pan/Tilt Angle See “Setting pan/tilt angle” in “Parameters” on page 17. ppp:Pan angle,qqq:Tilt angle
	SetPTZMask	8x 01 04 7B mm 0p 0p 0p 0q 0q 0q 0r 0r 0r 0r FF	Pan:0000~0800, 0800~0FFE Tilt:0000~0400, 0C00~0FFE Setting the direct position of PTZ See “mm:Masksettinglist” and “Setting pan/tilt angle” in “Parameters” on page 17. ppp:Pan,qqq:Tilt,rrrr:Zoom

Privacy Zone Inquiry Command List

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_Privacy Display Inq	8x090477FF	y0 50 pp pp pp pp FF	Inquiry about the status of Setting Mask Display On/Off See "pppppppp:Maskbit" in "Parameters" on page17. 1:On,0:Off
CAM_Privacy Pan Tilt Inq	8x090479FF	y0 50 0p 0p 0p 0q 0q 0q FF	ppp:Pan(0800~0FFE, 0000~0800) qqq:Tilt(0000~0400, 0C00~0FFE) Inquiry about the pan/tilt position currently set See "Setting pan/tilt angle" in "Parameters" on page17. ppp:Pan, qqq:Tilt
CAM_Privacy PTZ Inq	8x09047BmmFF	y0 50 0p 0p 0p 0q 0q 0q 0r 0r 0r 0r FF	ppp:Pan(0800~0FFE, 0000~0800) qqq:Tilt(0000~0400, 0C00~0FFE) Inquiry about pan/tilt/zoom position at the mm Mask setting See "mm:Mask setting list" and "Setting pan/tilt angle" in "Parameters" on page17. ppp:Pan Position, qqq:Tilt Position rrrr:Zoom Position
CAM_Privacy Monitor Inq	8x09046FFF	y0 50 pp pp pp pp FF	pppppppp:Maskbit(0~7) Inquiry about the mask currently displayed See "pppppppp:Maskbit" in "Parameters" on page17.

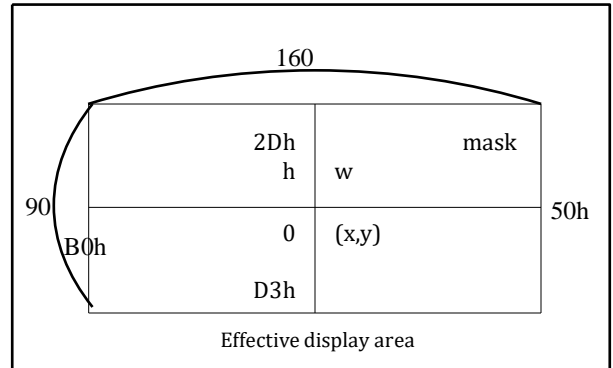
Parameters

mm: Mask setting list

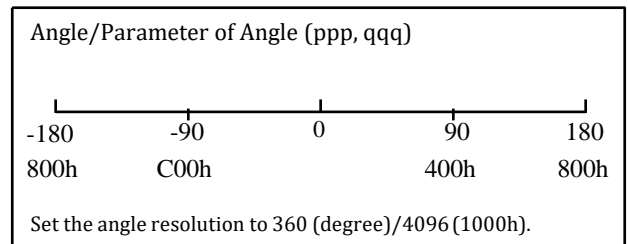
Mask Name	mm(Hex)
Mask_1	00h
Mask_2	01h
Mask_3	02h
Mask_4	03h
Mask_5	04h
Mask_6	05h
Mask_7	06h
Mask_8	07h

The priority order of the mask display is in the sequence from A (highest) to X(lowest).
When you set the parameters of masks non-sequentially, it is recommended that you set the mask whose priority order is higher, first.

pp: x, qq: y, rr: w, ss: h

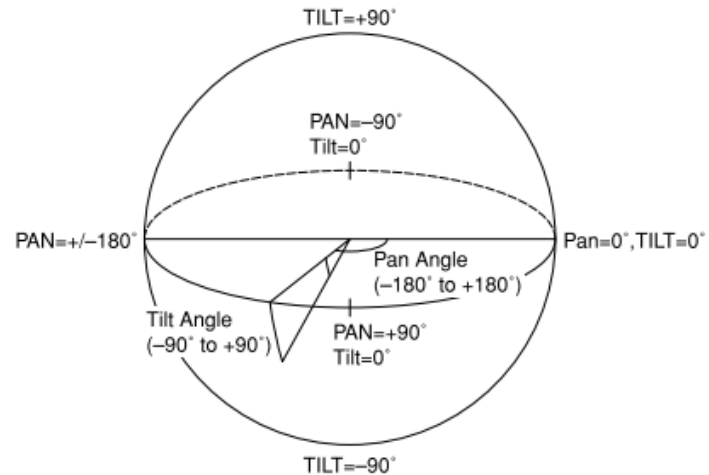


Setting pan/tilt angle



qq, rr: Color code

Mask (Color)	Code (qq, rr)
Black	00h
Gray1	01h ~ 06h
White	07h
Red	08h
Green	09h
Blue	0Ah
Cyan	0Bh
Yellow	0Ch
Magenta	0Dh



nn	Setting
00	Resetting the zone size (the value of w,h) for the existing mask.
01	Setting newly the zone size (the value of w,h).

Details of Setting Commands

Set Mask

Command: 8x 01 04 76 mm nn 0r 0r 0s 0s FF

Parameters:

m	Setting Mask
m	See "mm: Mask setting list" in "Parameters" on page 17.
n	Selects new setting or resetting for the zone. See "nn: Setting" in "Parameters" on page 17.
rr	Sets the half value "w" of the Mask Width.
ss	Sets the half value "h" of the Mask Height. See "pp: x, qq: y, rr: w, ss: h" in "Parameters" on page 17.

Comments: To set the mask, first display the object at the center of the screen. When "nn" is set to 1, the current Pan/Tilt/Zoom position is recorded in internal memory.

When "nn" is set to 0, the Pan/Tilt/Zoom position in memory is not changed.

Notes

- The tilt angle at which you can set the mask is between -70 to +70 degrees.
- It is recommended that you set the size to at least twice the size of the object (height and width).

Set Display

Command: 8x 01 04 77 pp pp pp pp FF

Parameter:

pp pp pp pp	Each 8 Privacy Zones corresponds to 1 bit. See "pp pp pp pp: Mask bit" in "Parameters" on page 17.
--------------------	--

Comments: Each of 8 Privacy zones can be switched on and off individually by a single VISCA command. If you want to display a Privacy zone, you must set its bit to 1. If you do not want to display a Privacy zone, you must set its bit to 0.

Set Mask Color

Command: 8x 01 04 78 pp pp pp pp qq rr FF

Parameter:

pp pp pp pp	Each 8 Privacy Zones correspond with the BIT. See "pp pp pp pp: Mask bit" in "Parameters" on page 17.
qq	Set the color code
rr	Set the color code. See "qq, rr: Color code" in "Parameters" on page 17.

Comments: Two different color masks can be chosen.

Two colors can be individually set for each of 24 privacy zones.

If the bit of parameter (pp pp pp pp) is set to "0", mask color will be "qq" color (Color code). If the bit of parameter (pp pp pp pp) is set to "1", the mask color will be "rr" color (Color code).

Example: 8x 01 04 78 00 00 00 03 00 07 FF
The mask color of Mask_A and Mask_B is White (color code 07h), and the mask color of the other Mask (C to X) is Black (color code 00h).

Set PanTilt Angle

Command: 8x 01 04 79 0p 0p 0p 0q 0q 0q FF

Parameter:

ppp	Pan Angle
qqq	Tilt Angle See "Setting pan/tilt angle" in "Parameters" on page 17.

Comments: Pan/Tilt angle settings are hexadecimal data.

The resolution of Pan/Tilt angle is 0.088 degrees.

Note.

- When you set the pan/tilt angle, locate the pan/tilt position at the center point of the camera's position.
- If you set the pan/tilt angle or zoom the camera, a bigger mask will be displayed for about one second.

Set PTZ Mask

Command: 8x 01 04 7B mm 0p 0p 0p 0q 0q 0q
Or Or Or Or FF

Parameter:

mm	Setting Mask See "mm: Mask setting list" in "Parameters" on page 17.
ppp	Pan Angle (000 to FFF) See "Setting pan/tilt angle" in "Parameters" on page 17.
qqq	Tilt Angle (000 to FFF) See "Setting pan/tilt angle" in "Parameters" on page 17.
rrrr	Zoom Position (000 to 4000) See "Zoom Ratio and Zoom Position (for reference)" on page 49.

Comments: Mask can be set at the desired Position by setting the pan tilt angle and zoom position using this command. The set value can be input by hexadecimal number.

Command List

VISCA/RS-232C Commands

In VISCA, the device outputting commands, for example, a computer, is called the controller. The device receiving the commands, an camera is called the peripheral device. In VISCA, up to seven peripheral devices like the camera can be connected to one controller using communication conforming to the RS-232C standard. The parameters of RS-232C are as follows.

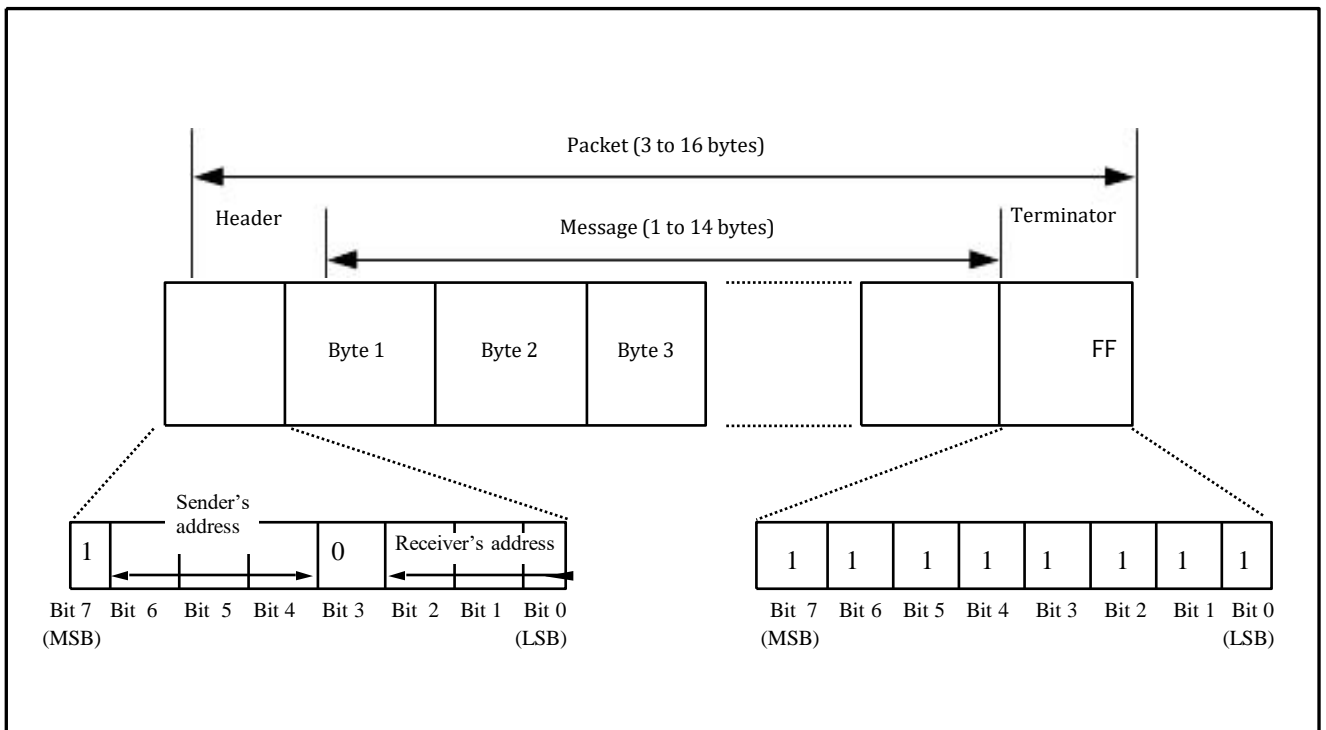
- 1) Communication speed: 9.6 kbps/19.2 kbps/38.4 kbps
- 2) Data bits : 8
- 3) Start bit : 1
- 4) Stop bit : 1
- 5) Parity : None

Flow control using XON/XOFF and RTS/CTS, etc., is not supported.

VISCA Communication Specifications

VISCA packet structure

The basic unit of VISCA communication is called a packet. The first byte of the packet is called the header and comprises the sender's and receiver's addresses. For example, the header of the packet sent to the camera assigned address 1 from the controller (address 0) is hexadecimal 81H. The packet sent to the camera assigned address 2 is 82H. In the command list, as the header is 8X, input the address of the camera at X. The header of the reply packet from the camera assigned address 1 is 90H. The packet from the camera assigned address 2 is A0H. Some of the commands for setting cameras can be sent to all devices at one time (broadcast). In the case of broadcast, the header should be hexadecimal 88H. When the terminator is FFH, it signifies the end of the packet.



Command and inquiry

1) Command

Sends operational commands to the camera.

2) Inquiry

Used for inquiring about the current state of the camera.

CommandPacket

Inquiry 8XQRR...FF

X = 1 to 7: camera address

Note

QQ1)=Command/Inquiry,

RR2)=categorycode

1) QQ=01(Command),09(Inquiry)

2) RR=00(Interface),04(camera1),06(Pan/Tilter),07(camera2)

Error Packet

X06Y01FF

X06Y02FF

X06Y03FF

X06Y04FF

X06Y05FF

X06Y41FF

Description

Message length error(>14bytes)

Syntax Error

Command buffer full

Command cancelled

No socket(to be cancelled)

Command not executable

X=9toF:cameraaddress+8,Y=socketnumber

Socket number

When command messages are sent to the camera, it is normal to send the next command message after waiting for the completion message or error message to return.

However to deal with advanced uses, the camera has two buffers (memories) for commands, so that up to two commands including the commands currently being executed can be received.

When the camera receives commands, it notifies the sender which command buffer was used using the socket number of the ACK message. As the completion message or error message also has a socket number, it indicates which command has ended. Even when two command buffers are being used at any one time, an camera management command and some inquiry messages can be executed. The ACK message is not returned for these commands and inquiries, and only the completion message of socket number 0 is returned.

Command execution cancel

To cancel a command which has already been sent, send the Cancel command as the next command. To cancel one of any two commands which have been sent, use the cancel message.

Cancel Packet

Cancel

8X2YFF

Note

Y=socketnumber

X=1to7:cameraaddress, Y=socketnumber

An error message will be returned for this command, but this is not a fault. It indicates that the command has been canceled.

Responses for commands and inquiries

1) ACK message

Returned by the camera when it receives a command. No ACK message is returned for inquiries.

2) Completion message

Returned by the camera when execution of commands or inquiries is completed. In the case of inquiry commands, it will contain reply data for the inquiry after the 3rd byte of the packet. If the ACK message is omitted, the socket number will contain 0.

ReplyPacket

Ack

X04YFF

Y=socketnumber

Completion(commands)

X05YFF

Y=socketnumber

Completion(Inquiries)

X05Y...FF

Y=socketnumber

X=9toF:cameraaddress+8

* Error message

When a command or inquiry command could not be executed or failed, an error message is returned instead of the completion message.

VISCA Device Setting Command

Before starting control of the camera, be sure to send the Address command and the IF_Clear command using the broadcast function.

For VISCA network administration

1) Address

Sets an address of a peripheral device. Use when initializing the network, and receiving the following network change message.

2) Network Change

Sent from the peripheral device to the controller when a device is removed from or added to the network.

The address must be re-set when this message is received.

	Packet	Note
Address	88 30 01 FF	Always broadcasted.
Network Change	X0 38 FF	

X=9toF:camera address+8

VISCA interface command

• IF_Clear

Clears the command buffers in the camera and cancels the command currently being executed.

	Command Packet	Reply Packet	Note
IF_Clear	8X010001FF	X050FF	
IF_Clear(broadcast)	88010001FF	88010001FF	

X=1to7:camera address(For inquiry packet)

X=9toF:camera address+8(For reply packet)

VISCA interface and inquiry

• CAM_Version Inq

Returns information on the VISCA interface.

	Inquiry Packet	Reply Packet	Description
Inquiry	8X090002FF	Y050GGGGHHHHJJJKKFF	GGGG=
CAM		(0020:Device)	VenderID
Version Inq		HHHH=Model ID	
		045C:Camera	
		JJJJ=ROM revision	
		KK=Maximum socket#{02}	

X=1to7:camera address(For inquiry packet)

X=9toF:camera address+8(For reply packet)

www.cmr-cctv.com

VISCA Command/ACK Protocol

Command	Command Message	Reply Message	Comments
General Command	81 01 04 38 02 FF (Example)	90 41 FF (ACK)+90 51 FF (Completion) 90 42 FF 90 52 FF	Returns ACK when a command has been accepted, and Completion when a command has been executed.
	81 01 04 38 FF (Example)	90 60 02 FF (Syntax Error)	Accepted a command which is not supported or a command lacking parameters.
	81 01 04 38 02 FF (Example)	90 60 03 FF (Command Buffer Full)	There are two commands currently being executed, and the command could not be accepted.
	81 01 04 08 02 FF (Example)	90 61 41 FF (Command Not Executable) 90 62 41 FF	Could not execute the command in the current mode.
Inquiry Command	81 09 04 38 FF (Example)	90 50 02 FF (Completion)	ACK is not returned for the inquiry command.
	81 09 05 38 FF (Example)	90 60 02 FF (Syntax Error)	Accepted an incompatible command.
Address Set	88 30 01 FF	88 30 02 FF	Returned the device address to +1.
IF_Clear (Broadcast)	88 01 00 01 FF	88 01 00 01 FF	Returned the same command.
IF_Clear (For x)	8x 01 00 01 FF	z0 50 FF (Completion)	ACK is not returned for this command.
Command Cancel	8x 2y FF	z0 6y 04 FF (Command Canceled)	Returned when the command of the socket specified is canceled. Completion for the command canceled is not returned.
		z0 6y 05 FF (No Socket)	Returned when the command of the specified socket has already been completed or when the socket number specified is wrong.

VISCA Camera-Issued Messages

ACK/Completion Messages

	Command Messages	Comments
ACK	z0 4y FF (y:Socket No.)	Returned when the command is accepted.
Completion	z0 5y FF (y:Socket No.)	Returned when the command has been executed.

z = Device address + 8

Error Messages

	Command Messages	Comments
Syntax Error	z0 60 02 FF	Returned when the command format is different or when a command with illegal command parameters is accepted.
Command Buffer Full	z0 60 03 FF	Indicates that two sockets are already being used (executing two commands) and the command could not be accepted when received.
Command Canceled	z0 6y 04 FF (y:Socket No.)	Returned when a command which is being executed in a socket specified by the cancel command is canceled. The completion message for the command is not returned.
No Socket	z0 6y 05 FF (y:Socket No.)	Returned when no command is executed in a socket specified by the cancel command, or when an invalid socket number is specified.
Command Not Executable	z0 6y 41 FF (y:Socket No.)	Returned when a command cannot be executed due to current conditions. For example, when commands controlling the focus manually are received during auto focus.

Network Change Message

	Command Message	Comments
Network Change	z0 38 FF	Issued when power is being routed.

Camera VISCA Commands

Command List (1/5)

Command Set	Command	Command Packet	Comments
AddressSet	Broadcast	88 30 01 FF	Address setting
IF_Clear	Broadcast	88 01 00 01 FF	I/F Clear
CAM_Power	On	8x 01 04 00 02 FF	Power ON/OFF
	Off (Standby)	8x 01 04 00 03 FF	
CAM_Zoom	Stop	8x 01 04 07 00 FF	p=0 (Low) to 7 (High) pqrs: Zoom Position
	Tele (Standard)	8x 01 04 07 02 FF	
	Wide (Standard)	8x 01 04 07 03 FF	
	Tele (Variable)	8x 01 04 07 2p FF	
	Wide (Variable)	8x 01 04 07 3p FF	
	Direct	8x 01 04 47 0p 0q 0r 0s FF	
CAM_DZoom	On	8x 01 04 06 02 FF	Digital zoom ON/OFF
	Off	8x 01 04 06 03 FF	
	Combine Mode	8x 01 04 36 00 FF	Optical/Digital Zoom Combined
	Separate Mode	8x 01 04 36 01 FF	Optical/Digital Zoom Separate
	Stop	8x 01 04 06 00 FF	
	Tele (Variable)	8x 01 04 06 2p FF	p=0 (Low) to 7 (High)
	Wide (Variable)	8x 01 04 06 3p FF	* Enabled during Separate Mode
	x1/Max	8x 01 04 06 10 FF	x1/MAX Magnification Switchover * Enabled during Separate Mode
	Direct	8x 01 04 46 0p 0q 0r 0s FF	pq: D-Zoom Position * Enabled during Separate Mode
CAM_Focus	Stop	8x 01 04 08 00 FF	p=0 (Low) to 7 (High) pqrs: Focus Position (0x1000 ~ 0xC000) AF ON/OFF One Push AF Trigger pqrs: Focus Near Limit Position (0x1000 ~ 0xC000)
	Far (Standard)	8x 01 04 08 02 FF	
	Near (Standard)	8x 01 04 08 03 FF	
	Far (Variable)	8x 01 04 08 2p FF	
	Near (Variable)	8x 01 04 08 3p FF	
	Direct	8x 01 04 48 0p 0q 0r 0s FF	
	Auto Focus	8x 01 04 38 02 FF	
	Manual Focus	8x 01 04 38 03 FF	
	Auto/ Manual	8x 01 04 38 10 FF	
	One Push Trigger	8x 01 04 18 01 FF	
	Near Limit	8x 01 04 28 0p 0q 0r 0s FF	

Command List (2/5)

Command Set	Command	Command Packet	Comments
CAM_AF Mode	Normal AF	8x 01 04 57 00 FF	AF Movement Mode
	Interval AF	8x 01 04 57 01 FF	
	Zoom Trigger AF	8x 01 04 57 02 FF	
	Active/Interval Time	8x 01 04 27 0p 0q 0r 0s FF	pq: Movement Time, rs: Interval
CAM_Initialize	Lens	8x 01 04 19 01 FF	Lens Initialization Start
	Camera	8x 01 04 19 03 FF	Camera reset
CAM_WB	Auto	8x 01 04 35 00 FF	Normal Auto
	Indoor	8x 01 04 35 01 FF	Indoor mode
	Outdoor	8x 01 04 35 02 FF	Outdoor mode
	One Push WB	8x 01 04 35 03 FF	One Push WB mode
	Manual	8x 01 04 35 05 FF	Manual Control mode
	One Push Trigger	8x 01 04 10 05 FF	One Push WB Trigger
	Anti - Rolling	8x 01 04 35 09 FF	Anti-Rolling mode
CAM_RGain	Reset	8x 01 04 03 00 FF	Manual Control of R Gain
	Up	8x 01 04 03 02 FF	
	Down	8x 01 04 03 03 FF	
	Direct	8x 01 04 43 00 00 0p 0q FF	pq: R Gain (0x00~0x14)
CAM_BGain	Reset	8x 01 04 04 00 FF	Manual Control of B Gain
	Up	8x 01 04 04 02 FF	
	Down	8x 01 04 04 03 FF	
	Direct	8x 01 04 44 00 00 0p 0q FF	pq: B Gain (0x00~0x14)
CAM_AE	Full Auto	8x 01 04 39 00 FF	Automatic Exposure mode
	Manual	8x 01 04 39 03 FF	Manual Control mode
	Shutter Priority	8x 01 04 39 0A FF	Shutter Priority Automatic Exposure mode
	Iris Priority	8x 01 04 39 0B FF	Iris Priority Automatic Exposure mode
	Bright	8x 01 04 39 0D FF	Bright mode (Manual control)
CAM_SlowShutter	Auto	8x 01 04 5A 02 FF	Auto Slow Shutter ON/OFF
	Manual	8x 01 04 5A 03 FF	
	Limit	8x 01 04 5A 1p FF	p: MAX slow shutter level (0: x2, 1: x4, 2: x8)
CAM_Shutter	Reset	8x 01 04 0A 00 FF	Shutter Setting
	Up	8x 01 04 0A 02 FF	
	Down	8x 01 04 0A 03 FF	
	Direct	8x 01 04 4A 00 00 0p 0q FF	pq: Shutter Position (0x00~ 0x0F)

Command List (3/5)

Command Set	Command	Command Packet	Comments
CAM_Iris	Reset	8x 01 04 0B 00 FF	Iris Setting
	Up	8x 01 04 0B 02 FF	
	Down	8x 01 04 0B 03 FF	
	Direct	8x 01 04 4B 00 00 0p 0q FF	pq: Iris Position (0x00 ~ 0x11)
CAM_Gain	Reset	8x 01 04 0C 00 FF	Gain Setting
	Up	8x 01 04 0C 02 FF	
	Down	8x 01 04 0C 03 FF	
	Direct	8x 01 04 4C 00 00 0p 0q FF	pq: Gain Position (0x00 ~ 0x0F)
	Gain Limit	8x 01 04 2C 0p FF	p: Gain Position
CAM_Bright	Reset	8x 01 04 0D 00 FF	Bright Setting
	Up	8x 01 04 0D 02 FF	
	Down	8x 01 04 0D 03 FF	
	Direct	8x 01 04 4D 00 00 0p 0q FF	pq: Bright Position (0x00 ~ 0x1F)
CAM_Exp Comp	On	8x 01 04 3E 02 FF	Exposure Compensation ON/OFF
	Off	8x 01 04 3E 03 FF	
	Reset	8x 01 04 0E 00 FF	Exposure Compensation Amount Setting
	Up	8x 01 04 0E 02 FF	
	Down	8x 01 04 0E 03 FF	
	Direct	8x 01 04 4E 00 00 0p 0q FF	pq: ExpComp Position (0x00 ~ 0x0E)
CAM_BackLight	On	8x 01 04 33 02 FF	Back Light Compensation ON/OFF
	Off	8x 01 04 33 03 FF	
CAM_WD	On	8x 01 04 3D 02 FF	Wide-D ON/OFF
	Off	8x 01 04 3D 03 FF	
CAM_Defog	On	8x 01 04 37 02 0p FF	Defog ON/OFF
	Off	8x 01 04 37 03 00 FF	p: Defog level (0: mid, 1: low, 2: mid, 3: high)
CAM_Aperture	Reset	8x 01 04 02 00 FF	Aperture Control
	Up	8x 01 04 02 02 FF	
	Down	8x 01 04 02 03 FF	
	Direct	8x 01 04 42 00 00 0p 0q FF	pq: Aperture Gain (0x00 ~ 0x0A)
CAM_NR	—	8x 01 04 53 0p FF	p: NR Setting (0: OFF, level 1 to 5)
CAM_Gamma	—	8x 01 04 5B 0p FF	p: Gamma setting (0: Standard, 1 to 4)
CAM_LR_Reverse	On	8x 01 04 61 02 FF	Mirror Image ON/OFF
	Off	8x 01 04 61 03 FF	

Command List (4/5)

Command Set	Command	Command Packet	Comments
CAM_Freeze	On	8x 01 04 62 02 FF	Still Image ON/OFF
	Off	8x 01 04 62 03 FF	
CAM_PictureEffect	Off	8x 01 04 63 00 FF	Picture Effect Setting
	Neg.Art	8x 01 04 63 02 FF	
	Black & White	8x 01 04 63 04 FF	
CAM_Picture Flip	On	8x 01 04 66 02 FF	Picture flip ON/OFF
	Off	8x 01 04 66 03 FF	
CAM_ICR	On	8x 01 04 01 02 FF	Infrared Mode ON/OFF
	Off	8x 01 04 01 03 FF	
CAM_Auto ICR	On	8x 01 04 51 02 FF	Auto dark-field mode On/Off
	Off	8x 01 04 51 03 FF	
	Threshold	8x 01 04 21 00 00 0p 0p FF	pp : (0x00 ~ 0x1C) Auto ICR Threshold
CAM_Stabilizer	On	8x 01 04 34 02 FF	Stabilizer ON/OFF/HOLD
	Off	8x 01 04 34 03 FF	
	Hold	8x 01 04 34 00 FF	
CAM_Display	On	8x 01 04 15 02 FF	Display ON/OFF
	Off	8x 01 04 15 03 FF	
	On/Off	8x 01 04 15 10 FF	
CAM_Multi Line Title	Title Set1	8x 01 04 73 1L 00 nn pp qq 00 00 00 00 00 00 FF	L: Line Number, nn: H-position pp: Color, qq: Blink
	Title Set2	8x 01 04 73 2L mm nn pp qq rr ss tt uu vv ww FF	L: Line Number, mnpqrstuvw: Setting of characters (1 to10)
	Title Set3	8x 01 04 73 3L mm nn pp qq rr ss tt uu vv ww FF	L: Line Number, mnpqrstuvw: Setting of characters (11 to 20)
	Title Clear	8x 01 04 74 1p FF	Title Setting clear (p: 0h to Ah, F= all lines)
	On	8x 01 04 74 2p FF	Title display On/Off (0h to Ah, F= all lines)
	Off	8x 01 04 74 3p FF	
CAM_Privacy Zone	Set Mask	8x 01 04 76 mm nn	mm : MaskSettings
		0r 0r 0s 0s FF	nn : 00=Modify, 01=New
			rr : W, ss : H
	Display	8x 01 04 77 pp pp pp pp FF	Mask Display On/Off pppppppp : MaskSettings (0 : OFF, 1 : ON)
	Set Mask	8x 01 04 78 pp pp pp pp	pppppppp : Mask Color Settings
	Color	qq rr FF	qq : Color Setting when 0 is selected
			rr : Color Setting when 1 is selected

Command List (5/5)

Command Set	Command	Command Packet	Comments
CAM_Privacy Zone	Set Pan Tilt	8x 01 04 79 0p 0p 0p	Pan/Tilt Angle Settings
	Angle	0q 0q 0q FF	ppp : Pan, qq : Tilt
	Set PTZ Mask	8x 01 04 7B mm 0p 0p 0p	Pan/Tilt/Zoom Settings for Mask
		0q 0q 0q 0r 0r 0r 0r FF	mm : Mask Settings
			ppp : Pan, qq : Tilt, rrrr : Zoom
CAM_ID Write	—	8x 01 04 22 0p 0q 0r 0s FF	pqrs: Camera ID (=00 to FF)
CAM_MD	On	8x 01 04 1B 02 FF	Motion Detection On/Off
	Off	8x 01 04 1B 03 FF	
	Function Set	8x 01 04 1C 0m 0n 0p 0q 0r 0s FF	m, rs: Not Use
			n: Detection Frame Set (0~3)
			pq: Threshold Level (00~FF)
	Window Set	8x 01 04 1D 0m 0p 0q rr 0s FF	m: Select Detection Frame (0, 1, 2, 3)
			p: Start Horizontal Position (0x00 ~ 0x0B)
q: Start Vertical Position (0x00 ~ 0x07)			
r: Stop Horizontal Position (0x01 ~ 0x10)			
		s: Stop Vertical Position (0x01 ~ 0x08)	
CAM_Register	—	8x 01 04 24 mm 0p 0p FF	mm::(0x00, 0x52, 0x72, 0x73, 0x74)
Value			pq : Register Value
CAM_ColorGain	Direct	8x 01 04 49 00 00 00 0p FF	P: Color Gain Setting 0 to E
CAM_ColorHue	Direct	8x 01 04 4F 00 00 00 0p FF	p: Color Hue setting 0h (-14 degrees) to Eh (+14 degrees)
CAM_HLC	Parameter Set	8x 01 04 14 pq 0r FF	p : HLC Color
			q : HLC On/Off (0: Off, 1: On)
			r : HLC level (0x0 ~ 0xF)

Inquiry Command List (1/3)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_Power Inq	8x 09 04 00 FF	y0 50 02 FF	On
		y0 50 03 FF	Off (Standby)
CAM_Zoom Pos Inq	8x 09 04 47 FF	y0 50 0p 0q 0r 0s FF	pqrs: Zoom Position
CAM_Dzoom Mode Inq	8x 09 04 06 FF	y0 50 02 FF	D-Zoom On
		y0 50 03 FF	D-Zoom Off
CAM_Dzoom C/S Mode Inq	8x 09 04 36 FF	y0 50 00 FF	Combine Mode
		y0 50 01 FF	Separate Mode
CAM_Dzoom Pos Inq	8x 09 04 46 FF	y0 50 00 00 0p 0q FF	pq: D-Zoom Position
CAM_Focus Mode Inq	8x 09 04 38 FF	y0 50 02 FF	Auto Focus
		y0 50 03 FF	Manual Focus
CAM_Focus Pos Inq	8x 09 04 48 FF	y0 50 0p 0q 0r 0s FF	pqrs: Focus Position
CAM_Focus Near Limit Inq	8x 09 04 28 FF	y0 50 0p 0q 0r 0s FF	pqrs: Focus Near Limit Position
CAM_AF Mode Inq	8x 09 04 57 FF	y0 50 00 FF	Normal AF
		y0 50 01 FF	Interval AF
		y0 50 02 FF	Zoom Trigger AF
CAM_WB Mode Inq	8x 09 04 35 FF	y0 50 00 FF	Auto
		y0 50 01 FF	Indoor
		y0 50 02 FF	Outdoor
		y0 50 05 FF	Manual
		y0 50 09 FF	Anti-Rolling mode
CAM_Rgain Inq	8x 09 04 43 FF	y0 50 00 00 0p 0q FF	pq: R Gain
CAM_Bgain Inq	8x 09 04 44 FF	y0 50 00 00 0p 0q FF	pq: B Gain
CAM_AE Mode Inq	8x 09 04 39 FF	y0 50 00 FF	Full Auto
		y0 50 03 FF	Manual
		y0 50 0A FF	Shutter Priority
		y0 50 0B FF	Iris Priority
		y0 50 0D FF	Bright
CAM_Slow Shutter Mode Inq	8x 09 04 5A FF	y0 50 02 FF	Auto
		y0 50 03 FF	Manual
CAM_SlowShutterLimit Inq	8x 09 04 5A 10 FF	y0 50 0p FF	p: Limit Slow Shutter (0: x2, 1: x4, 2: x8)
CAM_Shutter Pos Inq	8x 09 04 4A FF	y0 50 00 00 0p 0q FF	pq: Shutter Position
CAM_Iris Pos Inq	8x 09 04 4B FF	y0 50 00 00 0p 0q FF	pq: Iris Position
CAM_Gain Pos Inq	8x 09 04 4C FF	y0 50 00 00 0p 0q FF	pq: Gain Position
CAM_Gain Limit Inq	8x 09 04 2C FF	y0 50 0q FF	p: Gain Limit
CAM_Bright Pos Inq	8x 09 04 4D FF	y0 50 00 00 0p 0q FF	pq: Bright Position
CAM_Exp Comp Mode Inq	8x 09 04 3E FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_Exp Comp Pos Inq	8x 09 04 4E FF	y0 50 00 00 0p 0q FF	pq: Exp Comp Position
CAM_BackLight Mode Inq	8x 09 04 33 FF	y0 50 02 FF	On
		y0 50 03 FF	Off

Inquiry Command List (2/3)


Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_WD Mode Inq	8x 09 04 3D FF	y0 50 02 FF	On Wide-D
		y0 50 03 FF	Off
CAM_DefogInq	8x 09 04 37 FF	y0 50 02 00 FF	Defog ON
		y0 50 03 00 FF	Defog OFF
CAM_Aperture Inq	8x 09 04 42 FF	y0 50 00 00 0p 0q FF	pq: Aperture Gain
CAM_NR Mode Inq	8x 09 04 53 FF	y0 50 0p FF	Noise Reduction p: 0 to 5
CAM_Gamma Inq	8x 09 04 5B FF	y0 50 0p FF	Gamma p: 1 to 4
CAM_LR_Reverse	8x 09 04 61 FF	y0 50 02 FF	On
Mode Inq		y0 50 03 FF	Off
CAM_Freeze Mode Inq	8x 09 04 62 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_Picture Effect Mode Inq	8x 09 04 63 FF	y0 50 00 FF	Off
		y0 50 02 FF	Neg.Art
		y0 50 04 FF	B&W
CAM_Picture Flip	8x 09 04 66 FF	y0 50 02 FF	On
Mode Inq		y0 50 03 FF	Off
CAM_ICR Mode Inq	8x 09 04 01 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_Auto ICR	8x 09 04 51 FF	y0 50 02 FF	On
Mode Inq		y0 50 03 FF	Off
CAM_Auto ICR	8x 09 04 21 FF	y0 50 00 00 0p 0q FF	pq: ICR ON → OFF Threshold Level
THreshold Inq			
CAM_Display Mode Inq	8x 09 04 15 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_StabilizerModeInq	8x 09 04 34 FF	y0 05 02 FF	On
		y0 05 03 FF	Off
		y0 05 00 FF	Hold
CAM_Privacy Display Inq	8x 09 04 77 FF	y0 50 pp pp pp pp FF	pp pp pp pp: Mask Display (0: OFF, 1: ON)
CAM_Privacy Pan Tilt Inq	8x 09 04 79 FF	y0 50 0p 0p 0p 0q 0q 0q FF	ppp: Pan
			qqq: Tilt
CAM_Privacy PTZ Inq	8x 09 04 7B mm FF	y0 50 0p 0p 0p 0q 0q 0q 0r 0r 0r 0r	mm: Mask Settings
		FF	ppp: Pan, qqq: Tilt , rrr: Zoom
CAM_Privacy	8x 09 04 6F FF	y0 50 pp pp pp pp FF	pp pp pp pp: Mask is displayed now.
Monitor Inq			
CAM_ID Inq	8x 09 04 22 FF	y0 50 0p 0q 0r 0s FF	pqrs: Camera ID
CAM_Version Inq	8x 09 00 02 FF	y0 50 00 20	mnpq: Model Code (0402)
		mn pq rs tu vw FF	rstu: ROM version
			vw: Socket Number (=01)

Inquiry Command List (3/3)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_Revision Inq	8x 09 00 37 FF	y0 50 mn pq rs tu vw FF	mnpq: revision no.
			rstuvw: release date
			year/month/day
CAM_MD Mode Inq	8x 09 04 1B FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_MD Function Inq	8x 09 04 1C FF	y0 50 0m 0n 0p 0q FF	m: Display mode
			n: Detection Frame Set (0 to F)
			pq: Threshold Level (0 to FF)
			rs: Interval Time set (0 to FF)
CAM_MD Window Inq	8x 09 04 1D 0m FF	y0 50 0p 0q 0r 0s FF	m: Select Detection Frame (0, 1, 2, 3)
			p: Start Horizontal Position (00 to 0B)
			q: Start Vertical Position (00 to 07)
			r : Stop Horizontal Position (01 to 0C)
			s: Stop Vertical Position (01 to 08)
CAM_Register	8x 09 04 24 mm FF	y0 50 0p 0p ff	mm: Register No. (00 to 7F)
Value Inq			pp: Register Value (00 to FF)
CAM_Color Gain Inq	8x 09 04 49 FF	y0 50 00 00 00 0p FF	p: Color Gain setting
			0h (60%) to Eh (200%)
CAM_Color HueInq	8x 09 04 4F FF	y0 50 00 00 00 0p FF	p: Color Hue setting 0h (- 14 degrees) to Eh (+ 14 degrees)


VISCA Command Setting Values

Exposure control (1/2)

		60/30fps	50/25fps		
Shutter Speed	0x0F	1/30000	1/30000		
	0x0E	1/15000	1/15000		
	0x0D	1/10000	1/10000		
	0x0C	1/5000	1/5000		
	0x0B	1/2000	1/2000		
	0x0A	1/960	1/800		
	0x09	1/480	1/400		
	0x08	1/240	1/200		
	0x07	1/100	1/120		
	0x06	1/60	1/50		
	0x05	1/30	1/25		
	0x04	x2	x2		
	0x03	x4	x4		
	0x02	x8	x8		
	0x01	x16	x16		
	0x00	x32	x32		
Iris	0x11	OPEN			
	0x10				
	0x0F				
	0x0E				
	0x0D				
	0x0C				
	0x0B				
	0x0A				
	0x09				
	0x08				
	0x07				
	0x06				
	0x05				
	0x00			CLOSE	

Gain	0x0F	+60 dB
	0x0E	+56 dB
	0x0D	+52 dB
	0x0C	+48 dB
	0x0B	+44 dB
	0x0A	+40 dB
	0x09	+36 dB
	0x08	+32 dB
	0x07	+28 dB
	0x06	+24 dB
	0x05	+20 dB
	0x04	+16 dB
	0x03	+12 dB
	0x02	+8 dB
	0x01	+4 dB
	0x00	0 dB

Exposure control (2/2)

	VALUE	Bright
Bright	0x1F	Bright
	0x1E	
	0x1D	
	0x1C	
	0x1B	
	0x1A	
	0x19	
	0x18	
	0x17	
	0x16	
	0x15	
	0x14	
	0x13	
	0x12	
	0x11	
	0x10	
	0x0F	
	0x0E	
	0x0D	
	0x0C	
0x0B		
0x0A		
0x09		
0x08		
0x07		
0x06		
0x05		
0x00	Dark	

Zoom Ratio and Zoom Position(1/2)
(for reference)

x36	
Mag	Pos
X1	0x0000
X2	0x14AC
X3	0x1E9E
X4	0x249A
X5	0x28BE
X6	0x2BE4
X7	0x2E68
X8	0x3087
X9	0x325F
X10	0x3409
X11	0x3585
X12	0x36E7
X13	0x3824
X14	0x3946
X15	0x3A43
X16	0x3B2F
X17	0x3BED
X18	0x3C9A
X19	0x3D2B
X20	0x3DA0
X21	0x3E0D
X22	0x3E5F
X23	0x3EA7
X24	0x3EE7
X25	0x3F1D
X26	0x3F4A
X27	0x3F78
x28	0x3F93

Zoom Ratio and Zoom Position (2/2) (for reference)

x36	
Mag	Pos
X29	0x3FAE
X30	0x3FC9
X31	0x3FD2
X32	0x3FDB
X33	0x3FE4
X34	0x3FED
X35	0x3FF6
X36	0x4000

Digital Zoom Separate mode

Digital Zoom Ratio	Digital Zoom Position Data
x1	0x00
x2	0x80
x3	0xAA
x4	0xC0
x5	0xCC
x6	0xD5
x7	0xDB
x8	0xE0
x9	0xE3
x10	0xE6
x11	0xE8
x12	0xEB

Digital Zoom Combine mode

Digital Zoom Ratio	Digital Zoom Position Data
x1	0x4000
x2	0x6000
x3	0x6A80
x4	0x7000
x5	0x7300
x6	0x7540
x7	0x76C0
x8	0x7800
x9	0x78C0
x10	0x7980
x11	0x7A00
x12	0x7AC0

Lens control

Zoom Position	0x0000 to 0x4000 to 0x7AC0 Wide end Optical Digital Tele end	
Focus Position	1000 to C000 Far end Near end	
Focus Near Limit	0x2000: 30 m 0x3000: 8 m 0x5000: 3m 0x7000: 1.5 m 0xB000: 0.5 m 0xE000: 0.1 m	As the distance on the left will differ due to temperature characteristics, etc., use as approximate values. * The lower 1 byte is fixed at 00.

Register Setting

Function	Register No.	Value	
Baudrate	0x00	0x10	2400 bps
		0x11	4800 bps
		0x00	9600 bps
		0x01	19200 bps
		0x02	38400 bps
		0x03	115200 bps
E. Zoom Max.	0x52	0x00~0xEB	Max. Dzoom Ratio = $256 / (256 - \text{Value})$
Monitoring Mode	0x72	0x06	1080p30
		0x08	1080p25
		0x13	1080p60
		0x14	1080p50
Output Enabling	0x73	0x02	Analog output disabled.
		0x03	Analog output enabled.
		0x04	Analog output auto detection.
LVDS mode	0x74	0x00	Single output
		0x01	Dual output

Extended Command List (1/2)

Command Set	Command	Command Packet	Comments
CAM_User OSD	Display String	8x 01 05 10 xx yy cc ss aa nn~nn FF	xx : X position (0 ~ 27h) yy : Y position (0 ~ Eh) cc : Color (fixed 07, white) ss : Style (Normal : 00 Inverse : 01 Blink : 02) aa : Number of character nn~nn : String (max 26 char)
	Display Blue Screen	8x 01 05 20 pq FF	p : alpha blending (0 ~ 3) q : Display (off : 0 on : 1)
	Clear Screen	8x 01 05 30 01 FF	Clear all screen

Character code

code	character	code	character	code	character	code	character	code	character	code	character
00	Space	10	0	20	@	30	P	40	`	50	p
01	!	11	1	21	A	31	Q	41	a	51	q
02	"	12	2	22	B	32	R	42	b	52	r
03	#	13	3	23	C	33	S	43	c	53	s
04	\$	14	4	24	D	34	T	44	d	54	t
05	%	15	5	25	E	35	U	45	e	55	u
06	&	16	6	26	F	36	V	46	f	56	v
07	'	17	7	27	G	37	W	47	g	57	w
08	(	18	8	28	H	38	X	48	h	58	x
09	)	19	9	29	I	39	Y	49	i	59	y
0A	*	1A	:	2A	J	3A	Z	4A	j	5A	z
0B	+	1B	;	2B	K	3B	[	4B	k	5B	{
0C	,	1C	<	2C	L	3C	\	4C	l	5C	|
0D	-	1D	=	2D	M	3D	]	4D	m	5D	}
0E	.	1E	>	2E	N	3E	^	4E	n	5E	~
0F	/	1F	?	2F	O	3F	_	4F	o	5F	

Extended Command List (2/2)

Command Set	Command	Command Packet	Comments
CAM_MenuKey	On/Off	8x 01 05 04 01 FF	On/Off Switching
	Set	8x 01 05 04 02 01 FF	Center key, Set menu
	Left	8x 01 05 04 02 02 FF	Left key, Move left
	Right	8x 01 05 04 02 03 FF	Right key, Move right
	Up	8x 01 05 04 02 04 FF	Up key, Move up
	Down	8x 01 05 04 02 05 FF	Down key, Move down