Zoom Camera Module

Technical Manual

DTC-Z8240LV-T(A)

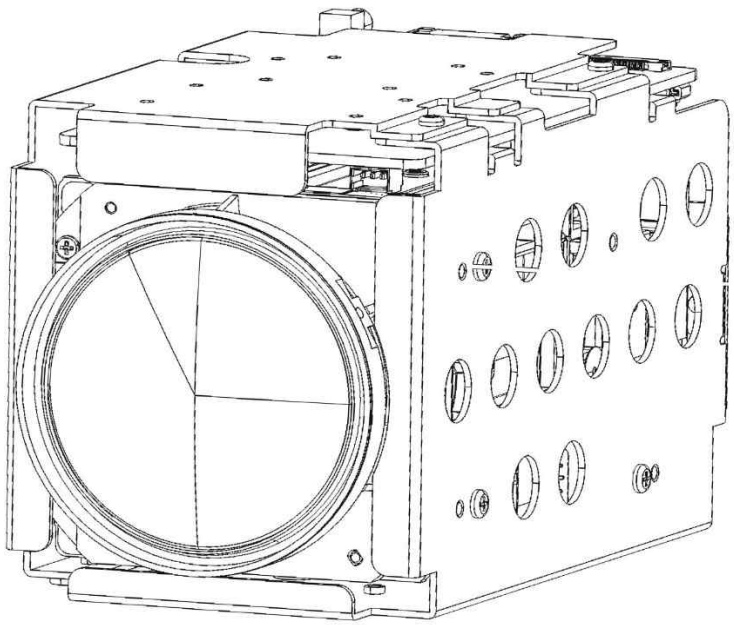

Table of Contents

Version	Date	Comments
1.0	2023-12-12	Draft, First Version

Model Naming Rule

- **DTC-Z8240LV-T(A)**

MODULE TYPE –LENS, OUTPUT – SENSOR, ISP – etc

TYPE	Acronym	Description
MOUDULE TYPE	D	D : Digital Output Moule
	B	B : Board Type Moudie
LENS TYPE	DTx	xT : Taron
	DZx	xZ : Zmax Optics
	DUx	xU : Union Optics
	Dxx	xx : Zoom Ratio
	Dxx	ex) C10 : ChiOptics 10X
SENSOR TYPE	Sx	S : Sony, P : Panasonic
	Px	x : Sensor Name
		ex) S1 : IMX385 , S2 : IMX327
ISP TYPE	Ex	E : Eyenix, M : Macro Image Technology , H : HiSilicon
	Mx	x : ISP Name
	Hx	ex) E0 : EN781F, M0 : MDIN i540
OUTPUT TYPE	HD	HD : HD-SDI , HDE : HD-SID & EX-SDI
	LV	LV : LVDS(BT1120) ,
	LS	LS : LVDS , HD-SDI
	HA(x)	HA : High Definition Analog
	IP	(x): T (TVI), A (AHD)
		IP : Network IP
RESERVED	xxx	Reserved xxx 00~99

Features

- **Image : 1/2.8” SONY CMOS Sensor**

  This Camera uses 1/2.8” type CMOS image sensor offering 2.1 mega pixel that supports FULL HD(high definition) to produce high-quality images.

- **Lens : 40X Optical Zoom**

  The camera is equipped with a bright zoom lens with 40x optical zoom and F1.5 aperture(optical zoom + digital zoom(12X) = 480x)

- **Full HD Resolution**

  1920x1080p 30fps(25fps)

  1920x1080p 60fps(50fps)

- **Advanced Digital Noise Reduction (2D/3D)**

  Temporal noise is reduced by 3D filter and spatial noise is reduced by 2D filter. Especially, the ghost effect is reduced by motion adaptive filter.

- **Wide Dynamic Range compensation (WDR)**

  This function is to expand the dynamic range.

  It uses alternative exposure time control method.

- **Adaptive Contrast Enhancer (ACE, D-WDR)**

  This function is based on the human visual system. ACE automatically calculates a different curve transformation for each pixel in image, based on an analysis of image segmentation.

- **Intelligent motion Detection**

  This function instructs the camera to detect movement within the monitoring area.

- **Defog function**

  This function improve image contrast under bad weather conditions such as fog, haze, and dust.

- **ICR (Day & Night)**

  An infrared (IR) Cut-Filter can be disengaged from image path for increased sensitivity in low light environments.

- **Privacy Mask Function**

  A Privacy Zone Masking function (max.8 blocks) is available.

- **On Screen Display**

  Supports 4 languages. (English, Russian, Korean, Chinese)

- **Output**

  Video Signal Output : LVDS BT1120, HD-SDI or EX-SDI

  Analog output : AHD or TVI/ CVBS(NTSC/ PAL)

- **Protocol**

  This camera supports VISCA, Pelco-D, Pelco-P protocol.

Precautions

- Power Supply : 9V to 12V DC
- Operation and storage locations

  * Do not use or store the camera in the following extreme condition:

  - Extremely hot or cold places(operation temperature -10°C ~ +50°C)
  - The Area that is dusty, greasy, wet or humid.
  - The Area that is subject to strong vibration
  - The Area that is subject to unstable lighting conditions(flicker, etc.)
  - The Area that is subject to light reflections
  - Close to generators of powerful electromagnetic radiation
  - The Area exposed to direct sunlight

- Always turn off the power supply before unplugging the interface connector.

  Do not apply excessive voltage. Use only the specified voltage.

  Otherwise, you may get an electric shock or a fire may occur.

Always connect the power supply to correct positive (+) and negative (-) terminals.

- In case of abnormal operation, contract your authorized dealer or store where you purchased the product.
- 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.

  * Rolling shutter

    As CMOS image sensors use shutters that capture images line-by-line, there is a slight time difference between the top and bottom of an image. As a result, images may appear skewed if the camera is moved.
- Phenomena Specific to Lenses

  * Ghosting

    If 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

Basic Function

- **Camera Control Protocol** :

  - Communication protocol : **VISCA packet structure, Pelco D/P**

  - Communication Speed : 2400/4800/**9600**/19200/38400/57600/115200bps

  - Communication timing : Command space of communication data requires space at least 1 field every basic unit.
- **Zoom**

  - **Optical 40x, Digital 12x, f=4.25mm ~ 170mm (F 1.6 ~ F4.95)**

    Allows you to up to 480x (Optical Zoom + Digital Zoom)

    The horizontal angle of view is approximately 66.35 degrees(wide end) to

1.9 degrees(tele end).

- Zoom Tracking Mode has the following mode

Auto mode : zoom in with auto focus

Track mode : zoom in with lens Focus, Track mode is useful for night

- Zoom Control has the following mode

Standard Mode : Zoom Control Speed is fixed internally.

Variable Mode

There are eight levels of zoom speed.

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

Direct Mode

Setting the zoom position enables quick movement to the designated position

Digital Zoom

The D-Zoom Mode supports, a OFF, Combined Mode and a Separate Mode.

Combined Mode

This is previously existing zoom method. After the optical zoom has reached its maximum level, execute digital zoom.

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 Continuous Zoom Position Reply

With Zoom Direct mode, or when zooming according to a preset, the camera outputs zoom position data when Continues Zoom Position is set to On vis a command.

Continuous Zoom Position Reply : y0 07 04 69 0p 0p 0q 0q 0q 0q FF

pp : D-Zoom Position, qqqq : Zoom Position

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- **Focus**

Focus has the following modes.

Auto Focus Mode

The minimum focus distance is 300mm at the optical wide end and 1200 mm at 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.

- Normal AF Mode : This is the normal mode for AF operations.

- Interval AF Mode

The mode used for AF movements carried out at particular intervals.

- Zoom Trigger Mode

When zoom position is changed and zoom stop , Auto Focus automatically adjusts the focus position.

Manual Focus Mode

Manual Focus Mode, you can control focus near or far position manually.

One Push Trigger Mode

When a Trigger 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.

When Zoom position is changed, One Push Trigger AF is executed automatically.

AF Sensitivity can be set.

- Normal

Reached the highest focus speed quickly.

- Low

Improves the stability of the focus, you can use When the lighting level is low.

Near Limit

Can be set in a range from 1000(Infinity) to F000(10 mm).

Initial setting is D000h(30 Cm)

- **Auto Exposure (AE)**

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

Full Auto

IRIS, Shutter Speed, Gain can be set automatically.

Gain Limit Setting

Priority, Iris Priority, Bright, Spot Exposure and Manual in the AE mode. Use this setting when you want to obtain image in which signal-to-noise ratio is particularly important.

Iris Priority

Adjust with Variable Iris (F1.6 to Close, 14 steps), Auto Gain and Shutter speed

Digital Slow Shutter.

Shutter Priority

Adjust with Variable Shutter Speed, Auto Gain and Shutter speed

Manual

Adjust with Variable Shutter, IRIS and Gain

- **White Balance**

White Balance has the following modes.

Auto

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 2500K to 7500K.
This mode is the initial setting.

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

This is a mode that enables you to manually set the control of R and B gain.

- **Backlight 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.

- **Wide Dynamic Range Mode**

  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. 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.
  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).

- **Advanced Contrast Enhancer (ACE)**

  Depending on the imaging scene, the Image Enhancer function makes the darker part of a camera image brighter, and automatically correct brightness and contrast to show bright parts clearly.

- **Defog mode**

  When the surrounding area of the subject is foggy and low contrast, the defog mode will make the subject appear clearer.
  You can select this function Auto or manual mode from the four levels: OFF, Low, Middle and High.

- **High Light Correction (HLC)**

  HLC (highlight correction) is a function to adjust AE and AF, and to perform the masking of light area as required when a high intensity spot light is detected.
  It allows you to easily read the number of vehicles and number plate in the indoor parking area or in the outdoor during the night.

- **Adaptive Digital Noise Reduction (2D/3D)**

  This feature removes noise in images(spatial, temporal domain). Temporal noise is reduced by 3D filter using frame memory and spatial noise is reduced by 2D filter. Especially, the ghost effect is reduced by motion adaptive filter.

- **Gamma Correction**

  You can set the gamma level 0.45 to 0.75 (4 step)

- **Digital Image Stabilizer**

  Switching On the Image Stabilizer function reduces image blurring caused by, for example, vibration, which allows you to obtain images without much blurring. A correction effect is possible for a vibration frequency of around 10 Hz. The Image Stabilizer function employs the digital zoom system, so the angle of view and resolutions are changed, but the sensitivity is maintained.

DIS stabilizes image based on Motion information from the shaking of camera, and can control Compensation Range, Filter Weight and Auto Centering via DIS Menu.

- **ICR (IR Cut-Removal) Mode**

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 ICR 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.

- **Others**

FLIP

This function reverses the video output from the camera vertically and horizontally.

MIRROR

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.

Memory (Position preset)

Using the position preset function, 16 sets of camera shooting conditions can be stored and recalled. This function allows you to achieve the desired status instantly, even without adjusting the following items each time.

Custom Preset

As with the position preset function, the camera shooting conditions can be stored and recalled. The settings are recalled when the power is turned on.

User Memory Area

As with the position preset function, the camera shooting conditions can be stored and recalled. The settings are recalled when the power is turned on.

Register Setting

The camera’s initial settings can be changed by the register setting command.

- **Privacy Zone Mask 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.
Interlocking control with zooming.

Interlocking control with Pan/Tilt.
Individual on/off zone masking settings.

Details of Setting Commands

Set Mask

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

Parameters :

mm	Setting Mask Number (0 ~ 7) MASK A = 00h ~ MASK H = 07h ※ Mask A has highest priority and Mask H has lowest priority pp pp : Mask bit
nn	Selects new setting or resetting for the zone. 00 : Resetting the zone size (the value of w,h) for the existing mask. 11 : Setting newly the zone size (the value of w,h).
rr	Sets the half value "w" of the Mask Width.
ss	Sets the half value "h" of the Mask Height.

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.

NOTE

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
Parameters : PP PP
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 to the BIT. (*Mask Bit)
qq	Set the color code
rr	Set the color code

Comments: Two different color masks can be chosen.
Colors can't be individually set for each of 8 privacy zones. If the bit of parameter 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).

Mask(Color)	Code(qq,rr)	Translucence (qq, rr)
Black	00h	10h
Gray1	01h	11h
Gray2	02h	12h
Gray3	03h	13h
Gray4	04h	14h
Gray5	05h	15h
Gray6	06h	16h

White	07h	17h
Red	08h	18h
Green	09h	19h
Blue	0Ah	1Ah
Cyan	0Bh	1Bh
Yellow	0Ch	1Ch
Magenta	0D	1D
Mosaic	7Fh	

Mask Bit (MB) : PP PP PP PP

	PP								PP							
bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
MB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

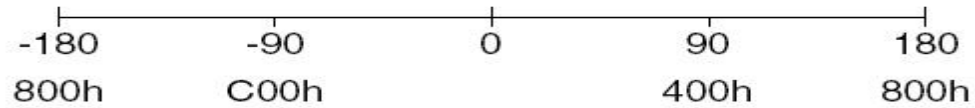
	PP								PP							
bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
MB	-	-	-	-	-	-	H	G	-	-	F	E	D	C	B	A

The "-" must be "0".

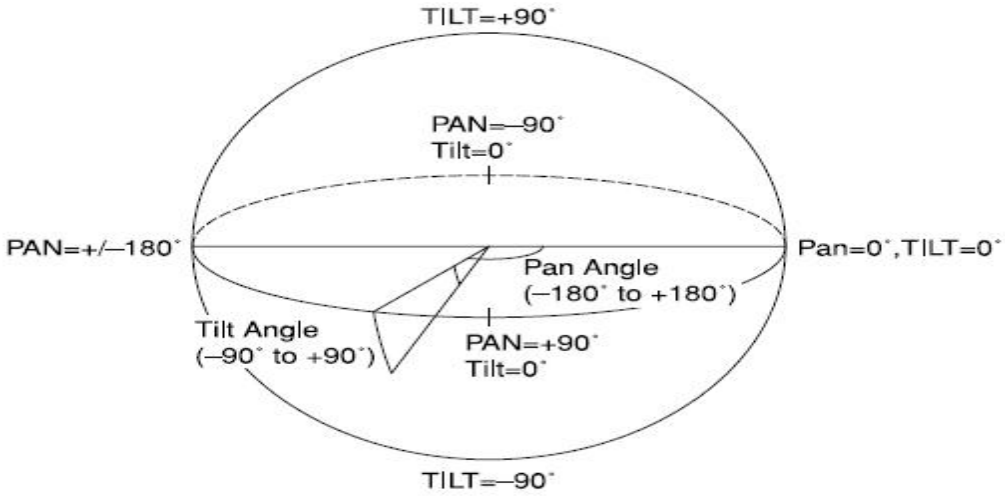
Set Pan Tilt Angle

Command : 8x 01 04 79 0p 0p 0p 0q 0q 0q FF
Parameter : PPP (Pan Abgle) , qqq (Tile Angle)
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.

Angle/Parameter of Angle (ppp, qqq)



Set the angle resolution to 360 (degree)/4096 (1000h).



Set PTZ Mask

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

mm	Setting Mask No
ppp	Pan Angle (000 to FFF)
qqq	Tilt Angle (000 to FFF)
rrr	Zoom Position (000 to 4000)

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.

Non Interlock Mask

Command: 8x 01 04 6F mm 0p 0p 0q 0q 0r 0r 0s 0s FF
Parameters:

mm	Setting Mask No
pp	Sets the center position "x" of the Mask on screen.
qq	Sets the center position "y" of the Mask on screen.
rr	Sets the half value "w" of the Mask Width.
ss	Sets the half value "h" of the Mask Height. "pp: x, qq: y, rr: w, ss: h"

Commands: Mask does not interlock with pan/tilt.
The limitations of parameters are as follows.(hexadecimal representation)
Mask Center position : x: B0h(-50h) ~ 50h , y: D3h(-2Dh) ~ 2Dh
Mask Size : w: ±50h , h: ±2Dh

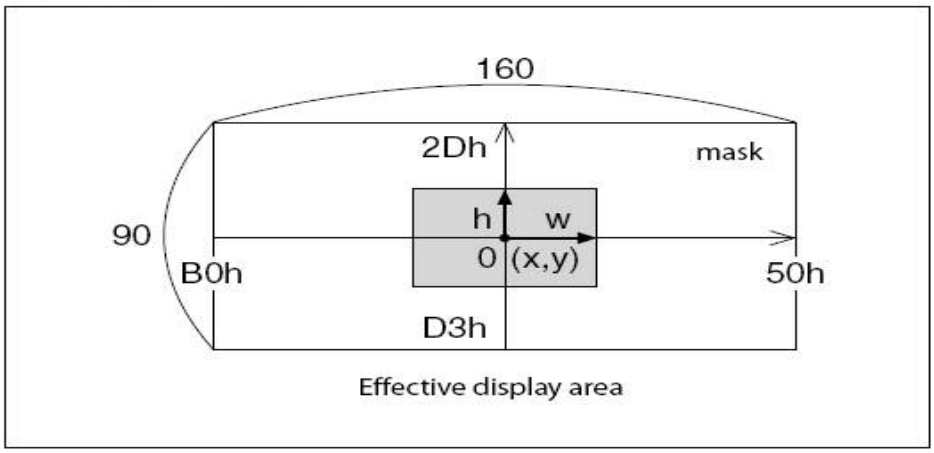
NOTE

When the Set Mask command and the Non Interlock Mask command are set to the same mask, the command set later becomes effective.

※ Mask Center position Can be set in Non-Interlock mode only.

In Interlock mask mode , Mask center position is fixed as (0,0).

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



- **Motion Detection**

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 VISCA

- Lens Initialize

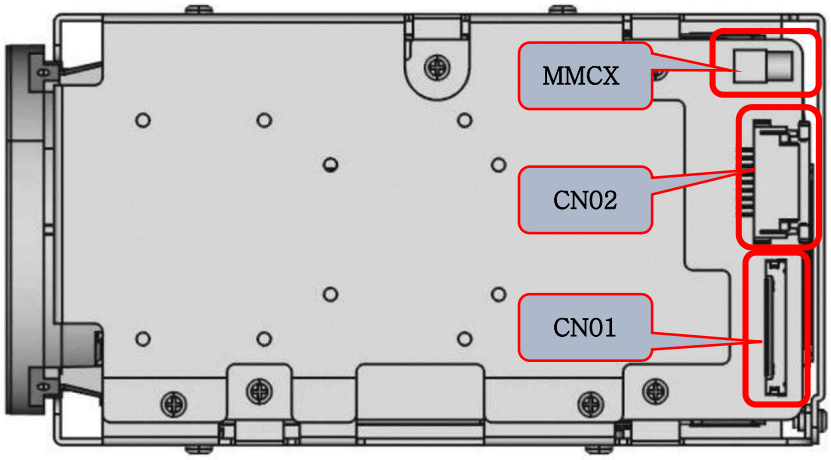
Initialize the zoom and focus of the lens. Even when power is already on, it initialize the Zoom and the Focus.

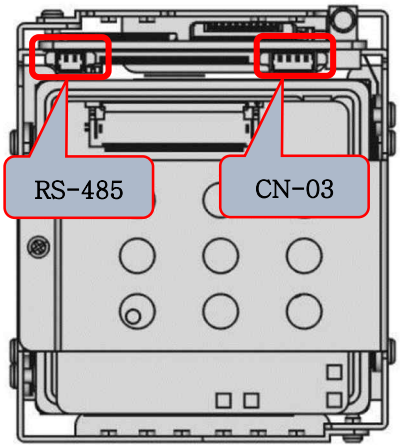
Specifications

1. Image Sensor	
Scan Mode	Progressive Scan
Optical size	1/2.8" 2MP SONY STARVIS CMOS sensor (SONY IMX327LQR1)-AR Coated
Number of active pixels	1,937(H) x 1,097(V), 2.12 M Pixels
Total number of pixels	1,945(H) x 1,109(V), 2.16 M Pixels
2. Video	
Resolution	LVDS/HD-SDI : 1080p60/50/30/25, 720p60/50/30/25, 1080i60/50 Option : 1080p59.94 EX-SDI : 1080p60/50/30/25, 720p60/50/30/25 AVI:1080p30/25 TVI:1080p30/25, 720p30/25 CVBS : 700TVL (4:3/ 16:9)
Frame rate	60fps (30fps at Frame WDR)
Video Output	Digital output Y/Cb/Cr 4:2:2 via LVDS (Single / Dual) HD-SDI or EX-SDI (1.0/ 2.0/ 2.1/3 .0) AHD or TVI CVBS (4:3/ 16:9) for monitoring
Signal Output Format	ITU-R BT.1120 Type, SMPTE 274M
Signal Output Sync	Embedded Sync (SAV/EAV)
3. Lens	
Lens Type	
Focal Length (Zoom Ratio)	4.25 ~ 170.0mm (Optical 40X)
Max. Aperture Ratio	1.6 (Wide) ~ 4.95 (Tele)
Min. Object Distance	*Wide 300mm, Tele 1000mm*
4. Performance & Special Function	
Min. Illumination	Color : 0.1 Lux @ 1/30Sec,F1.6 ,50IRE B/W : 0.025Lux @ 1/30Sec ,F1.6 ,50IRE
S / N Ratio	50 dB
Fast Focus Speed	Average less than 1 Sec
Fast Zoom Speed	Average less than 6 Sec
Auto White Balance	2000 to 10000K
Auto Exposure	Anti-flicker, Anti-diffraction
Cam IR Correction	Auto
5. Basic Function	
Zoom Control	AUTO/OFF
Preset Control	Off/On (128 position)
Lens Initialization	Auto/Manual
Focus Control	Auto/One-Shot/Manual
Focus Speed	Low/Mid/Fast
Focus Sensitivity	Normal/High
IRIS Control	Auto/Manual (Close, F28~F1.6)
Electric Shutter Control	Auto/Flicker/Manual (1/25,1/30 ~ 1/30,000)
Auto Gain Control	Low/Mid/High/Manual (0 ~ 36dB)
Digital Noise Reduction	Low/Mid/High/Off
Slow shutter	Off/2X~60X
Backlight Compensation	Off/BLC/WDR/HLC
White Balance	AUTO / Auto-Ext / Preset / Manual

Day & Night	Auto (ICR) / Color / B/W / EXTERN
De-Fog	Off/On
Advanced Contrast Enhancement	Off/On
Privacy Masking	Off / On (Max. 8 Rectangle for BOX (Module))
Image Enhancement	Sharpness / Gamma / Color gain adjustable
Mirror / Flip	Off/On
Digital Zoom	Off/On(12X) (480x with optical zoom)
Language (On Screen Display)	English, Russian, Korean, Chinese
Camera Title	Off / On (Displayed 15 characters)
Communication	CAM ID: 0 ~225 Remote : **RS-485 or RS-232** or AD Key Protocol : **VISCA** , Pelco-D/P TTL , 2400, 4800, **9600**, 19200, 38400, 57600, 115200bps
Coaxial Communication	AHD-UTC, TVI-UTC
6. Environmental	
Operating Temperature/Humidity	-10°C ~ +50°C/ Less than 90% RH
7. Electrical	
Input Voltage	DC12V±10%
Power Consumption	Max. 540mA
8. Mechanical	
Dimension (WxHxD)	53x62x101mm
Weight	Approx. 315g

Location of Connectors





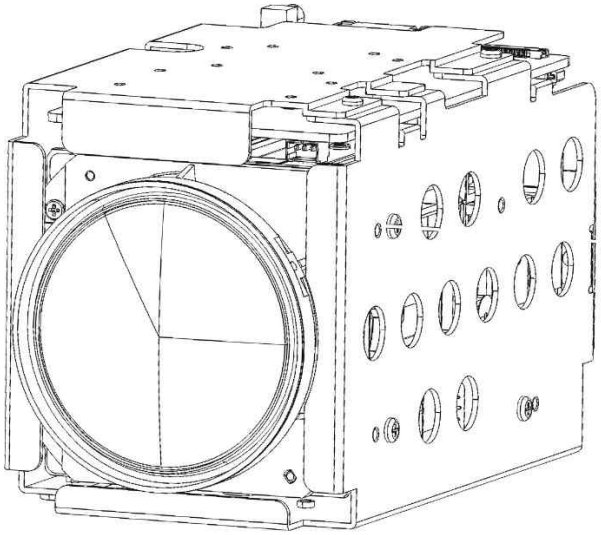
Pin assignment

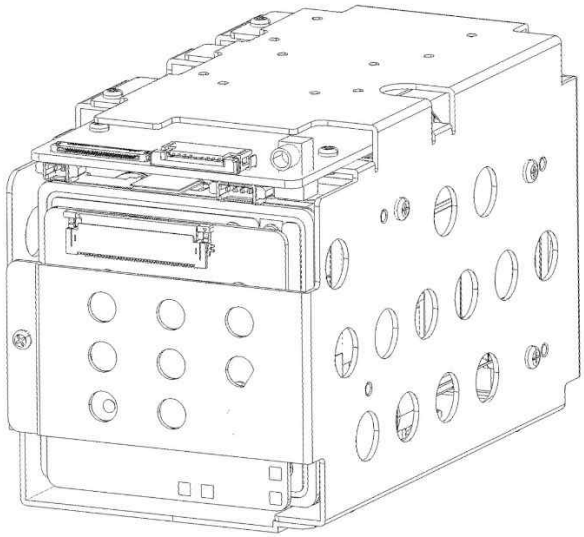
CN01 (LVDS) - USL00-30L-A 0.4mm) – (J109)					
Pin No	**Name**	**Signal**	**Pin No**	**Name**	**Signal**
1	TXOUT3+		16	DC IN	12V
2	TXOUT3–		17	DC IN	12V
3	TXCLKOUT+	LVDS _CLK	18	DC IN	12V
4	TXCLKOUT–	LVDS _CLK	19	GND	
5	TXOUT2+		20	GND	
6	TXOUT2–		21	TXOUT7+	Single out mode : open
7	TXOUT1+		22	TXOUT7-	Single out mode : open
8	TXOUT1-		23	TXOUT6+	Single out mode : open
9	TXOUT0+		24	TXOUT6-	Single out mode : open
10	TXOUT0-		25	EXSID+	
11	GND		26	EXSID-	
12	TxD1	CMOS 5 V	27	TXOUT5+	Single out mode : open
13	RxD1	CMOS 5 V	28	TXOUT5-	Single out mode : open
14	DC IN	12V	29	TXOUT4+	Single out mode : open
15	DC IN	12V	30	TXOUT4-	Single out mode : open

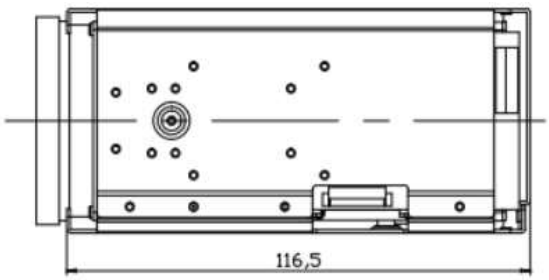
CN02 (9pin FFC) – BL113H-09RU-TAND 1.0mm - (J107)			CN03 (5pin) – 12505WR-07A00 1.25mm - (J110)		
Pin No	**Name**	**Signal**	**Pin No**	**Name**	**Signal**
1	Key (EN/GND)+	Option: AD Key	1	AD Key	
2	TVI	AHD_CVBS	2	TVI_Out	Or AHD
3	GND		3	GND	
4	CVBS	TVI_AHD	4	+12V_In	
5	GND		5	GND	
6	DC IN	+12V	6	RS485_TRX(+)	
7	GND		7	RS485_TRX(-)	
8	TXD		RS-485 (2pin) – 1.25mm - (J111)		
9	RXD		1	TRX+	RS485 TRX+
			2	TRX-	RS485 TRX-

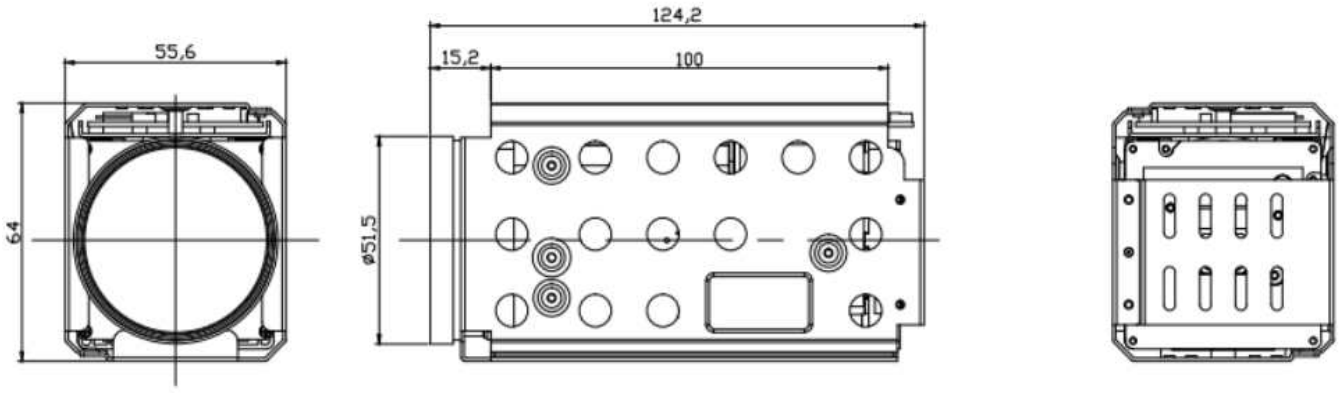
Mechanical Dimensions

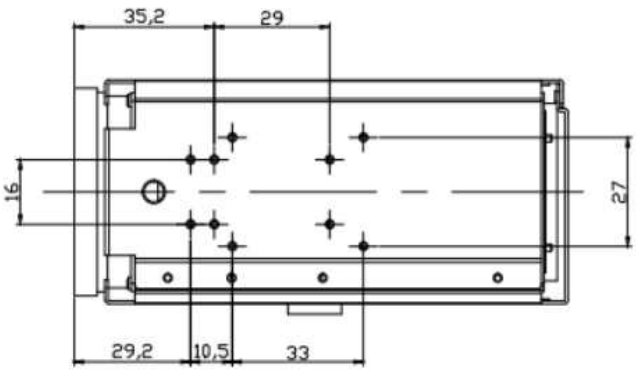
Dimension (WxHxD) : 56x64x124mm









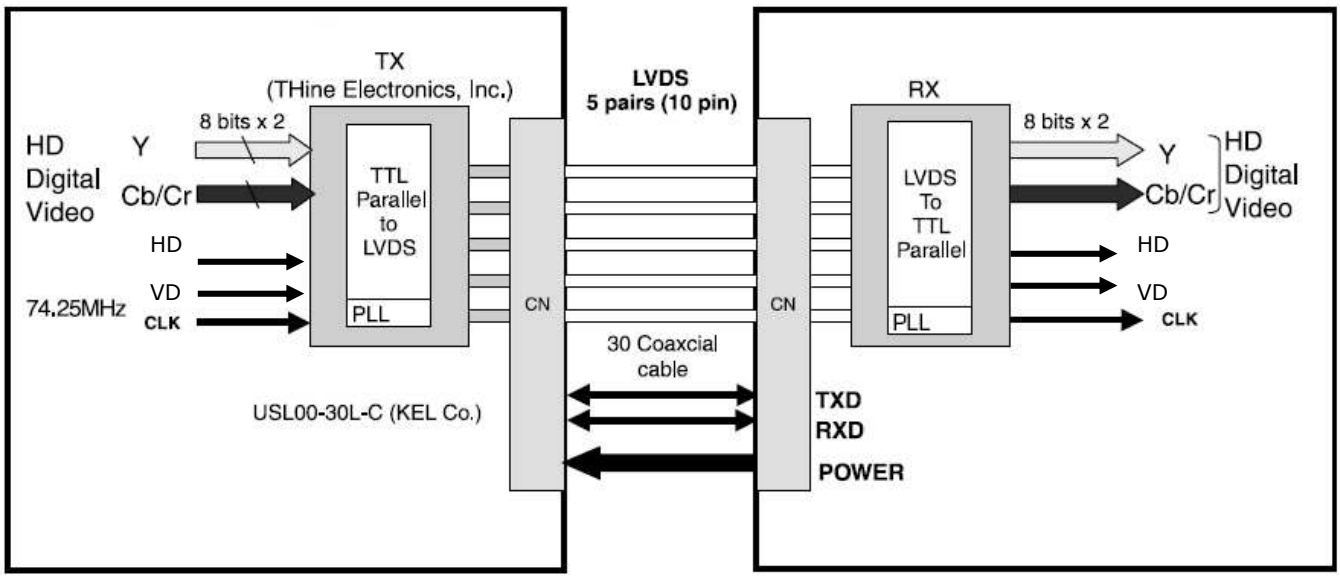


Digital output signal and interface

The camera ISP output a YCbCr 4:2:2 digital video signal, which is based upon ITU-R BT.709 and ITU-R BT.1120 data sequence. The data consists of Y-out 10bits, C-out 10bits, Vertical sync, and Horizontal sync. In addition, SAV (start of active video timing reference code) and EAV (End of Active Video timing reference code) are embedded within data lines.

Those signals are serialized and converted to multiple LVDS pairs, and output via the interface connector. The RS232C communication signals for camera control and DC power input are also included in the micro coaxial interface connector.

Interface



- The Module uses the LVDS transmitter IC chip (TH63LVDM827)
- The LVDS receiver IC chip (eq. THC63LVD104C, THC63LVD1024C, BU90R102) is Recommended
- Recommended connectors and cables

  Cable: #42 thin coaxial cable

  Connector : US00-30L-C (KEL)

Separate Sync Timing Chart : Vsync, Hsync output timing

- **Compatible SONY FCB series**

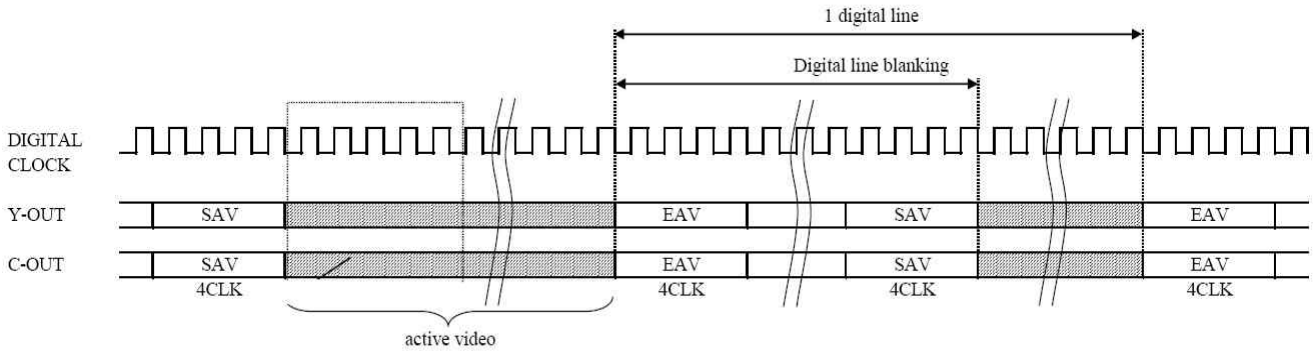
Embedded Sync Timing Chart : SAV/EAV format

SAV (start of active video timing reference code) and EAV (end of active video timing reference code) are embedded within data lines.

Y/C data range is 10bit and each line includes sync code

Sync code is organized as mentioned below.

- **Horizontal Timing**



- **SVV/EAV format**

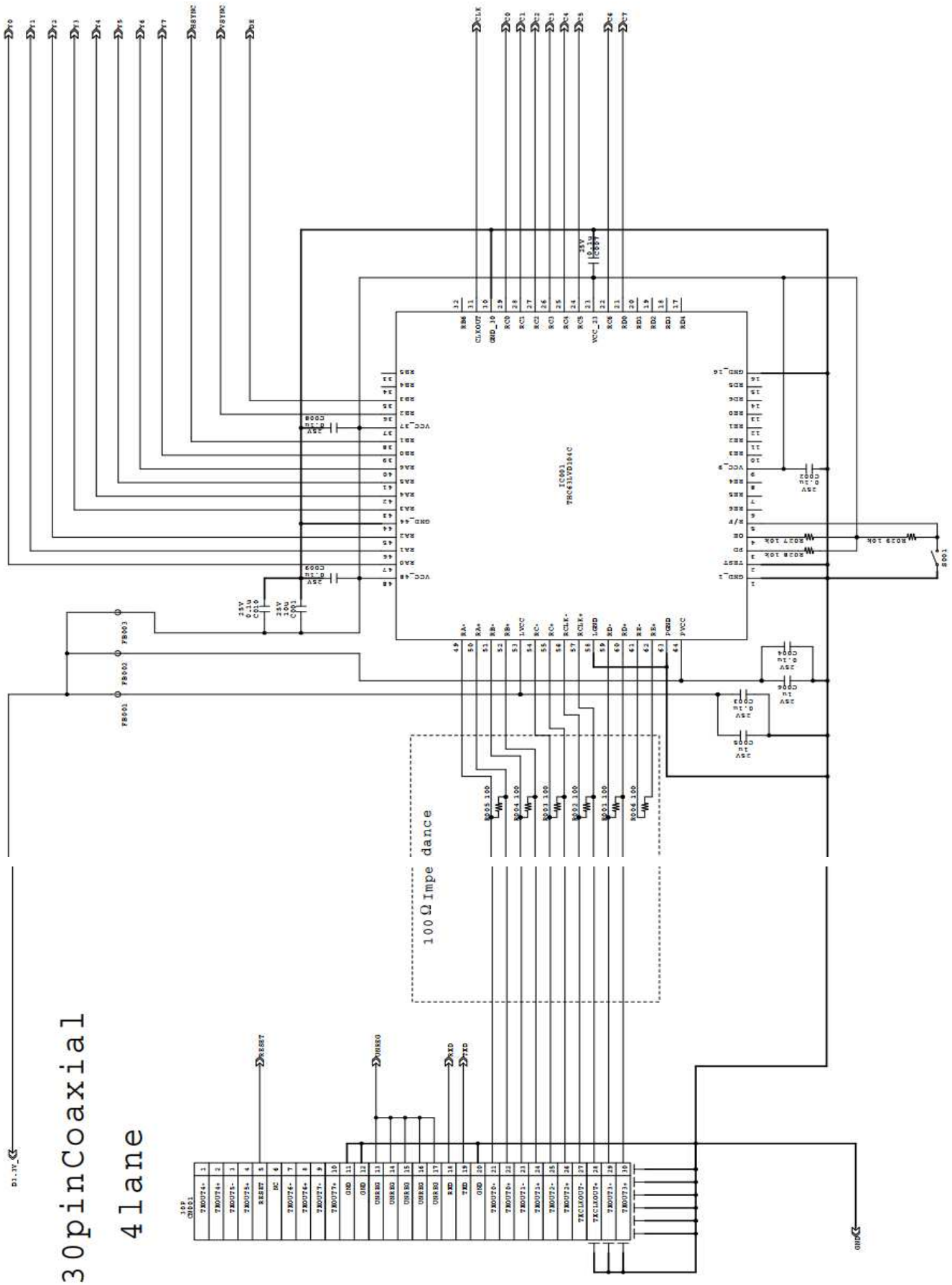
	D9 (MSB)	D8	D7	D6	D5	D4	D3	D2	D1	D0
Preamble	1	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
Status word	1	F	V	H	P3	P2	P1	P0	0	0

- **List of protection bits**

F	V	H	P3	P2	P1	P0
0	0	0	0	0	0	0
0	0	1	1	1	0	1
0	1	0	1	0	1	1
0	1	1	0	1	1	0
1	0	0	0	1	1	1
1	0	1	1	0	1	0
1	1	0	1	1	0	0
1	1	1	0	0	0	1

The fourth byte of [SAV/EAV] is defined as follows
F 0:odd field , 1:even field
V 0:picture effective line, 1:blanking line
H 0:SAV, 1:EAV
P3-P0 protection bits(decided by F,V,H)
P3 = V xor H
P2 = F xor H
P1 = V xor V
P0 = F xor V xor H

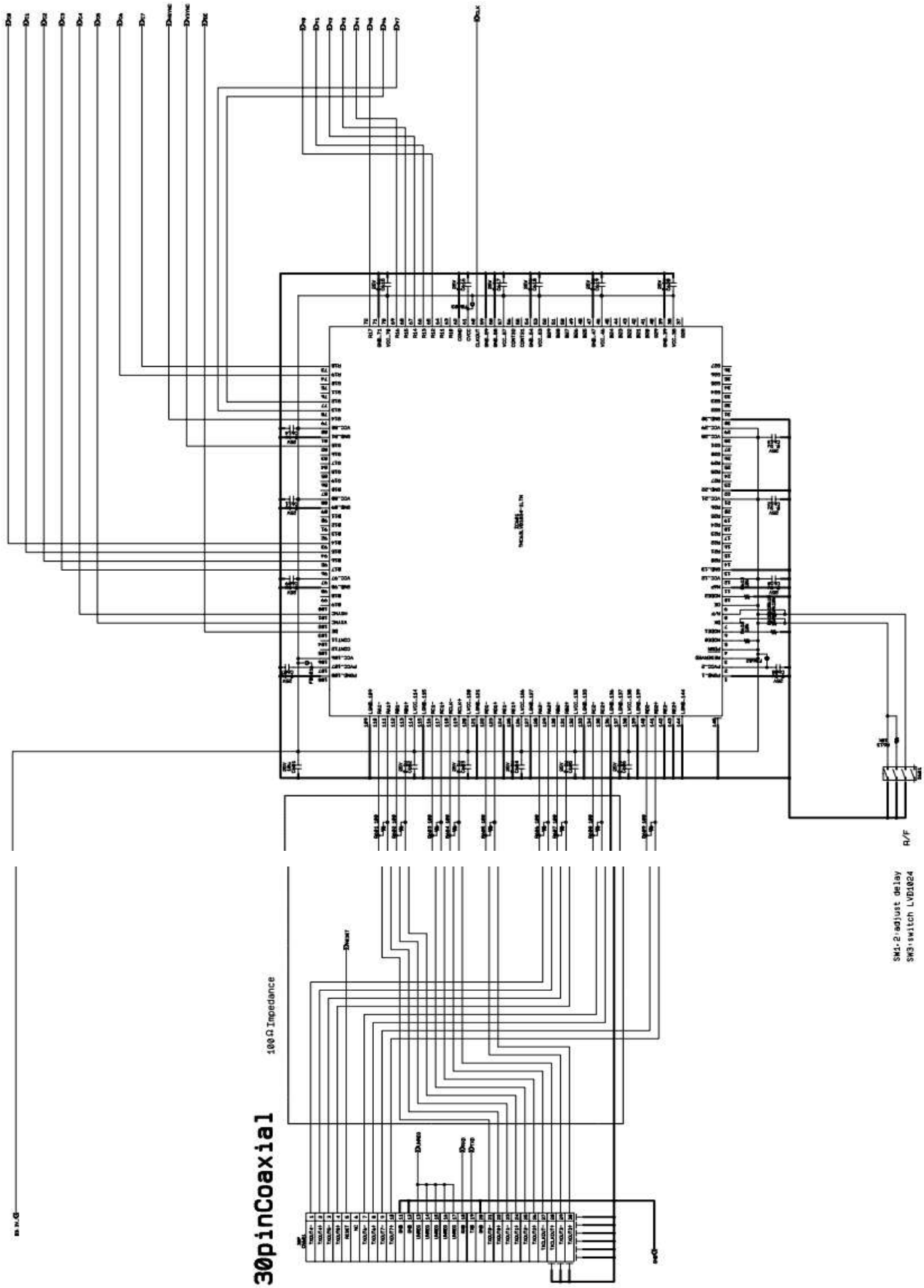
LVDS receiver circuit example (e.g. **THC63LVD104C) Single Output**



LVDS receiver IC (THC63LVD104C) Pin assignment

Pin No	Name	Direction	Description	Pin No	Name	Direction	Description
1	GND	Ground	Ground for TTL outputs and digital circuit.	33	RB5	OUT	
2	TEST	IN	Test Pin	34	RB4	OUT	
3	PD	IN		35	RB3	OUT	FLD
4	OE	IN		36	RB2	OUT	VSYNC
5	R/F	IN		37	VCC	Power	Power Supply
6	RE6	OUT		38	RB1	OUT	HSYNC
7	RE5	OUT		39	RB0	OUT	Y7
8	RE4	OUT		40	RA6	OUT	Y6
9	VCC	Power	Power Supply	41	RA5	OUT	Y5
10	RE3	OUT		42	RA4	OUT	Y4
11	RE2	OUT		43	RA3	OUT	Y3
12	RE1	OUT		44	GND	Ground	
13	RE0	OUT		45	RA2	OUT	Y2
14	RD6	OUT		46	RA1	OUT	Y1
15	RD5	OUT		47	RA0	OUT	Y0
16	GND	Ground		48	VCC	Power	Power Supply
17	RD4	OUT		49	RA-	LVDS IN	TXOUT0-
18	RD3	OUT		50	RA+	LVDS IN	TXOUT0+
19	RD2	OUT		51	RB-	LVDS IN	TXOUT1-
20	RD1	OUT		52	RB+	LVDS IN	TXOUT1+
21	RD0	OUT	C7	53	LVCC	Power	
22	RD6	OUT	C6	54	RC-	LVDS IN	TXOUT2-
23	VCC	Power	Power Supply	55	RC+	LVDS IN	TXOUT2+
24	RC5	OUT	C5	56	RCLK-	LVDS IN	TXCLKOUT-
25	RC4	OUT	C4	57	RCLK+	LVDS IN	TXCLKOUT+
26	RC3	OUT	C3	58	LGND	Ground	Ground
27	RC2	OUT	C2	59	RD-	LVDS IN	TXOUT3-
28	RC1	OUT	C1	60	RD+	LVDS IN	TXOUT3+
29	RC0	OUT	C0	61	RE-		
30	GND	Ground		62	RE+		
31	CLKOUT	OUT	CLK	63	PGND	Ground	Ground off PLL
32	RB6	OUT		64	PVCC	Power	Power Supply for PLL

LVDS receiver circuit example (e.g. **THC63LVD1024) Double Output**



LVDS receiver IC(THC63LVD104C) Pin assignment

Pin No.	Description	Signal
1	PGND_1	
2	PVCC_2	
3	RESERVED	
4	PDWN	
5	MODE0	
6	MODE1	
7	DK	
8	R/F	
9	OE	
10	MODE2	
11	MAP	
12	VCC_12	
13	GND_13	
14	R20	
15	R21	
16	R22	
17	R23	
18	R24	
19	R25	
20	R26	
21	VCC_21	
22	GND_22	
23	R27	
24	R28	
25	R29	
26	G20	
27	G21	
28	VCC_28	
29	VCC_29	
30	GND_30	
31	G22	
32	G23	
33	G24	
34	G25	
35	G26	
36	G27	
37	G28	
38	VCC_38	
39	GND_39	
40	G29	
41	B20	
42	B21	
43	B22	
44	B23	
45	B24	
46	VCC_46	
47	GND_47	
48	B25	
49	B26	
50	B27	

Pin No.	Description	Signal
51	B28	
52	B29	
53	VCC_53	
54	GND_54	
55	CONT21	
56	CONT22	
57	VCC_57	
58	GND_58	
59	GND_59	
60	CLKOUT	CLK
61	CVCC	
62	CGND	
63	R10	
64	R11	
65	R12	Y0
66	R13	Y1
67	R14	Y2
68	R15	Y3
69	R16	Y4
70	VCC_70	
71	GND_71	
72	R17	Y5
73	R18	C7
74	R19	C6
75	G10	
76	G11	
77	G12	Y6
78	G13	Y7
79	G14	HSYNC
80	VCC_80	
81	GND_81	
82	G15	VSYNC
83	G16	
84	G17	
85	G18	
86	G19	
87	B10	
88	VCC_88	
89	GND_89	
90	B11	
91	B12	
92	B13	
93	B14	C0
94	B15	C1
95	B16	C2
96	B17	C3
97	VCC_97	
98	GND_98	
99	B18	
100	B19	

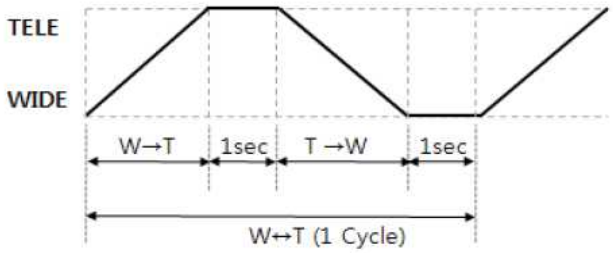
Pin No.	Description	Signal
101	HSYNC	C4
102	VSYNC	C5
103	DE	DE
104	CONT11	
105	CONT12	
106	VCC_106	
107	PVCC_107	
108	PGND_108	
109	LGND_109	
110	RA1−	TXOUT0−
111	RA1+	TXOUT0+
112	RB1−	TXOUT1−
113	RB1+	TXOUT1+
114	LVCC_114	
115	LGND_115	
116	RC1−	TXOUT2−
117	RC1+	TXOUT2+
118	RCLK−	TXCLKOUT−
119	RCLK+	TXCLKOUT+
120	LVCC_120	
121	LGND_121	
122	RD1−	TXOUT3−
123	RD1+	TXOUT3+
124	RE1−	
125	RE1+	
126	LVCC_126	
127	LGND_127	
128	RA2−	TXOUT4−
129	RA2+	TXOUT4+
130	RB2−	TXOUT5−
131	RB2+	TXOUT5+
132	LVCC_132	
133	LGND_133	
134	RC2−	TXOUT6−
135	RC2+	TXOUT6+
136	LGND_136	
137	LGND_137	
138	LVCC_138	
139	LVCC_139	
140	RD2−	TXOUT7−
141	RD2+	TXOUT7+
142	RE2−	
143	RE2+	
144	LGND_144	

Durability Test (at Normal Temperature)

- **Zoom**

  - 500,000 times

  - Operation Condition



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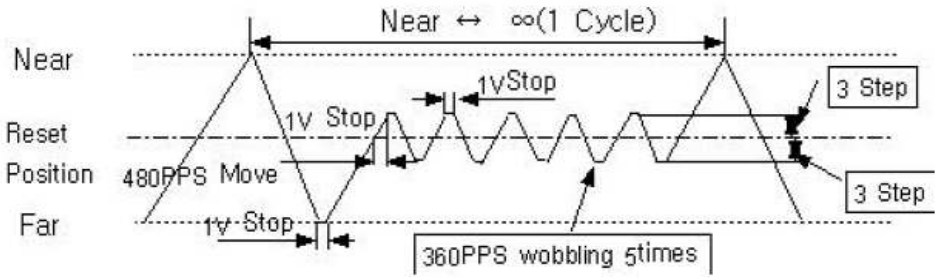
- **Focus**

  - 500,000 times

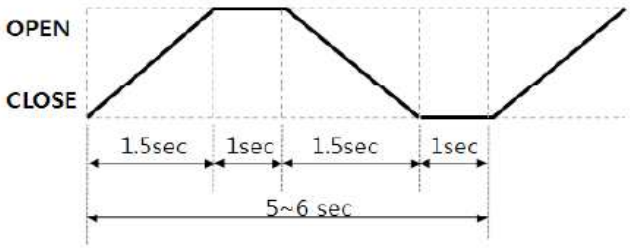
  - Operation Condition



- **IRIS**

  - 30,000 times

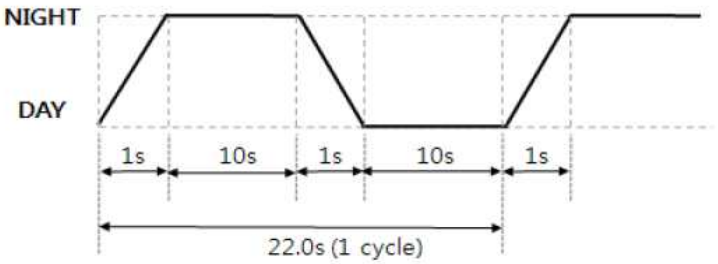
  - Operation Condition



- **IR Cut Filter**

  - 20,000 times

  - Operation Condition



Appendix)

Zoom Camera Module

Control Command User's Manual

This Camera supports the multi-protocol(Visca,PELCO-D,PELCO-P) .

General Information

Communication between the micom (microcomputer) of camera and a computer (is called the controller) is available by using the RS-485 or RS-232C protocol.

1. Communication protocol

- ID : 1~7(VISCA), 1~255(Pelco-D,Pelco-P)
- Speed : 2400,4800,9600(*),19200,38400,57600,115200 bps
- Data length : 8 bits
- Stop bits : 1 bit
- Parity : even, odd, none(*), (*):Factory default

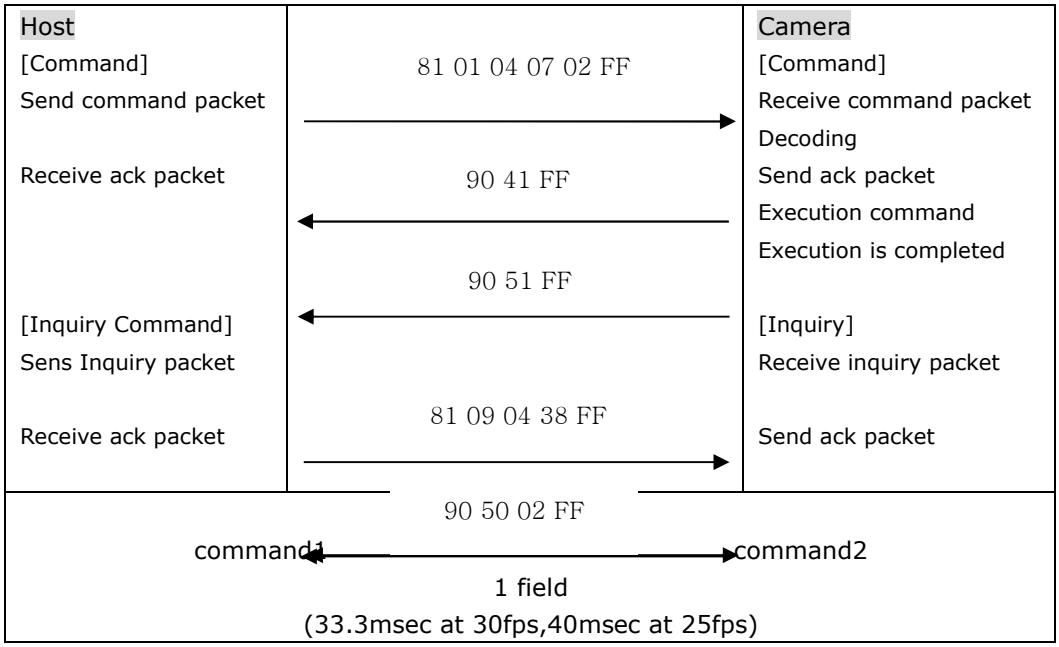
2. Communication data format

    - VISCA Command, Pelco-D, Pelco-P

3. Communication timing

- Command space of communication data requires space at least 1 field every basic unit.

※ communication sequence



- As Command processing can only be carried out one time in a Vertical cycle,
  It takes max.1V cycle time for an ACK/Completion to be returned.
- If the Command/Acknowledge/Completion communication time can be less than the 1V cycle time, then every 1V cycle can receive a Command.
- Command space requirement is over 1 field on following occasion
  (1)In case of execute lens initialization command (0x19h)
  (2)In case of using slow shutter by AE

Support Command
Not yet support command (reserved)

Pelco-P Command List

Function	BYTE1	BYTE2	BYTE3	BYTE4	BYTE5	BYTE6	BYTE7	BYTE8
	HEADER	ADDR	CMD1	CMD2	DATA1	DATA2	END	CheckSum
Zoom Tele	A0	ID	00	20	00	00	AF	CS
Zoom Wide	A0	ID	00	40	00	00	AF	CS
Focus Near	A0	ID	02	00	00	00	AF	CS
Focus Far	A0	ID	01	00	00	00	AF	CS
Stop	A0	ID	00	00	Don’t care		AF	CS
Menu(Set)	A0	ID	00	03	00	5F	AF	CS
ESC	A0	ID	00	03	00	60	AF	CS
Up	A0	ID	00	08	00	xx	AF	CS
Down	A0	ID	00	10	00	xx	AF	CS
Left	A0	ID	00	04	xx	00	AF	CS
Right	A0	ID	00	02	xx	00	AF	CS
Set Zoom Preset	A0	ID	00	03	00	Preset ID	AF	CS
Clear Zoom Preset	A0	ID	00	05	00	(01~05)	AF	CS
Go to Zoom Preset	A0	ID	00	07	00		AF	CS
Iris Open	A0	ID	04	00	00	00	AF	CS
Iris Close	A0	ID	08	00	00	00	AF	CS

- ID : Camera ID (1~255)
- XX : Speed (10h < xx < 40h)
- CS(Check sum) : XOR sum of byte 1~7

Pelco-D Command List

Function	BYTE1	BYTE2	BYTE3	BYTE4	BYTE5	BYTE6	BYTE7
	HEADER	ADDR	CMD1	CMD2	DATA1	DATA2	CheckSum
Zoom Tele	FF	ID	00	20	00	00	CS
Zoom Wide	FF	ID	00	40	00	00	CS
Focus Near	FF	ID	01	00	00	00	CS
Focus Far	FF	ID	00	80	00	00	CS
Stop	FF	ID	00	00	Don't care		CS
Menu(Set)	FF	ID	00	03	00	5F	CS
ESC	FF	ID	00	03	00	60	CS
Up	FF	ID	00	08	00	xx	CS
Down	FF	ID	00	10	00	xx	CS
Left	FF	ID	00	04	xx	00	CS
Right	FF	ID	00	02	xx	00	CS
Set Zoom Preset	FF	ID	00	03	00	Preset ID (01~05)	CS
Clear Zoom Preset	FF	ID	00	05	00		CS
Go to Zoom Preset	FF	ID	00	07	00		CS
Focus Mode	FF	ID	00	2B	00	00,01:Auto 02:Manual	CS
Iris Open	FF	ID	02	00	00	00	CS
Iris Close	FF	ID	04	00	00	00	CS

- ID : Camera ID (1~255)
- XX : Speed (10h < xx < 40h)
- CS(Check sum) : 8bit sum of byte 2~6

Command Set	Command	Command Packet	Comments
AddressSet	Broadcase	88 30 01 FF	Address setting
IF_Clear	Broadcast	88 01 00 01 FF	I/F Clear
		8x 01 00 01 FF	
CommandCancel		8x 2p FF	P:Socket No(=1~3)
CAM_Power	Power Reset	8x 01 04 00 03 FF	Camera Rebooting
CAM_Zoom	Stop	8x 01 04 07 00 FF	
	Tele(Standard)	8x 01 04 07 02 FF	
	Wide(Standard)	8x 01 04 07 03 FF	
	Tele(Variable)	8x 01 04 07 2p FF	P=0(Low) to 7(High)
	Wide(Variable)	8x 01 04 07 3p FF	
	Direct	8x 01 04 47 0p 0q 0r 0s FF	pqrs: Zoom Position
CAM_Zoom Preset (*Ww)	Set	8x 01 04 67 01 0p FF	p : Zoom Preset Number (0 ~ 4)
	Run	8x 01 04 67 02 0p FF	p : Zoom Preset Number (0 ~ 4)
	Clear	8x 01 04 67 03 0p FF	p : Zoom Preset Number (0 ~ 4, Fh : All)
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 Separated
	Stop	8x 01 04 06 00 FF	
	Tele(Variable)	8x 01 04 06 2p FF	p : 0(Slow) ~ 7(Fast) * Effective separate mode
	Wide(Variable)	8x 01 04 06 3p FF	
	X1/Max	8x 01 04 06 10 FF	x1/Max Magnification switchover * Effective separate mode
	Direct	8x 01 04 46 00 00 0p 0q FF	pq : D-Zoom Position * Effective separate mode
CAM_Focus	Stop	8x 01 04 08 00 FF	
	Far(Standard)	8x 01 04 08 02 FF	
	Near(Standard)	8x 01 04 08 03 FF	
	Far(Variable)	8x 01 04 08 2p FF	p:0(Slow) ~ 7(Fast)
	Near(Variable)	8x 01 04 08 3p FF	
	Direct	8x 01 04 48 0p 0q 0r 0s FF	pqrs : Focus Position
	Auto Focus	8x 01 04 38 02 FF	AF ON/OFF
	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	One Push AF Trigger
	Infinity	8x 01 04 18 02 FF	Forced Infinity (10M ~)
	Near Limit	8x 01 04 28 0p 0q 0r 0s FF	pqrs : Focus Near Limit Position 1Cm ~ 10M (Refer to Table #)
CAM_AFSensitivity	Normal	8x 01 04 58 02 FF	AF Sensivity High
	Low	8x 01 04 58 03 FF	AF Sensitivity Low
CAM_AFMode	Normal AF	8x 01 04 57 00 FF	Normal AF Mode
	Interval AF	8x 01 04 57 01 FF	Interval AF Mode
	Zoom Trigger AF	8x 01 04 57 02 FF	Zoom Trigger Mode
	Active/Interval Time	8x 01 04 27 0p 0q 0r 0s FF	pq : Active Time(1~255), rs : Interval Time(1~255)
CAM_IRCorrection	Standard	8x 01 04 11 00 FF	Focus IR Compensation data switching
	IR Light	8x 01 04 11 01 FF	
CAM_ZoomFocus	Direct	8x 01 04 47 0p 0q 0r 0s 0t 0u 0v 0w FF	pqrs : Zoom Position tuvw : Focus Position

Command List (1/8)

Command Set	Command	Command Packet	Comments
CAM_Initialize	Lens	8x 01 04 19 01 FF	Lens Initialize Start
	Comp Scan(*Ww)	8x 01 04 19 02 FF	Execute White spot compensation
	Camera	8x 01 04 19 03 FF	Camera Reset : Factory Default Val
	Comp Scan Thrs (*Ww)	8x 01 04 19 03 00 0p 0q FF	pq: Threshold of White spot compensation
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 AWB Mode (Preset)
	Manual	8x 01 04 35 05 FF	Manual Control Mode
	One Push Trigger	8x 01 04 10 05 FF	One Push AWB trigger
	Outdoor Auto	8x 01 04 35 06 FF	Outdoor auto
	Sodium Lamp Auto	8x 01 04 35 07 FF	Auto including sodium lamp source
	Sodium Lamp	8x 01 04 35 08 FF	Sodium lamp source fixed mode
	Sodium Lamp Outdoor Auto	8x 01 04 35 09 FF	Outdoor auto including sodium lamp source
CAM_RGain	Reset	8x 01 04 03 00 FF	Red Gain Manual setting
	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(0~14h)
CAM_BGain	Reset	8x 01 04 04 00 FF	Blue Gain Manual setting
	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(0~14h)
CAM_Chroma	Direct	8x 01 04 13 00 00 0p 0q FF	pq : Chroma level (0~14h)
CAM_AE	Full Auto	8x 01 04 39 00 FF	Auto exposure mode
	Manual	8x 01 04 39 03 FF	Manual control mode
	Shutter Priority	8x 01 04 39 0A FF	Shutter priority auto exposure mode
	Iris Priority	8x 01 04 39 0B FF	Iris priority auto exposure mode
	Bright	8x 01 04 39 0D FF	Bright Mode (Manual control)
CAM_AutoSlowShutter	Auto (On)	8x 01 04 5A 02 FF	Auto Slow Shutter ON/OFF
	Manual (Off)	8x 01 04 5A 03 FF	
CAM_MaxDSSLev (*Ww)	Direct	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 ~ 0x11) (Refer to Table #)
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 ,14step (Refer to Table #) , Close ~ F1.6

Command List (2/8)

Command Set	Command	Command Packet	Comments
CAM_Gain	Reset	8x 01 04 0C 00 FF	Gain Limit Default Set to Level 8
	Up	8x 01 04 0C 02 FF	Gain Limit up
	Down	8x 01 04 0C 03 FF	Gain Limit down
	Direct	8x 01 04 4C 00 00 0p 0q FF	pq : set Gain Limit Directly(0 ~ 0x0Ah)
CAM_AGC(*Ww)	On	8x 01 04 5C 02 FF	AGC Mode
	Off	8x 01 04 5C 03 FF	
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
CAM_ExpComp	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 (0 ~ 14h)
CAM_Flickerless (*Ww)	On	8x 01 04 7A 02 FF	Flickerless ON/OFF
	Off	8x 01 04 7A 03 FF	
CAM_BackLight	On	8x 01 04 33 02 FF	Back Light Compensation
	Off	8x 01 04 33 03 FF	
CAM_SpotAE	On	8x 01 04 59 02 FF	Spot Auto Exposure Setting
	Off	8x 01 04 59 03 FF	
	Position	8x 01 04 29 0p 0q 0r 0s FF	pq:X(0h to Fh),rs:Y(0h to Fh)
CAM_AE_Response	Direct	8x 01 04 5D pp FF	pp:Auto Exposure Response Setting(01h to 30h), default value :01h
CAM_BLCFunc(*Ww)	Area OSD Display	8x 01 04 3C 0p FF	p : 0(Area OSD Off), 1(Area OSD On)
	Area Start X	8x 01 04 3C 10 00 0p 0q FF	pq :Start Horizontal Position (0~36h),(14h)
	Area Start Y	8x 01 04 3C 20 00 0p 0q FF	pq : Start Vertical Position (0 ~ 3Ch),(14h)
	Area End X(SizeX	8x 01 04 3C 30 00 0p 0q FF	pq : End Horizontal Position (4~3Ah),(14h)
	Area End Y(SizeY	8x 01 04 3C 40 00 0p 0q FF	pq : End Vertical Position (4~40h),(14h)
CAM_HLC(*Ww)	Mode	8x 01 04 32 0p FF	p : HLC Mode - 0(Off), 1(On), 2(Night Only)
	Level	8x 01 04 32 10 00 0p 0q FF	pq : HLC Level (0~14h)
	Clip Color	8x 01 04 32 3p FF	p : HLC Color - 0 ~ Dh (0:BLK, 1~6:Gray1~6, 7:WHT, 8:RED, 9:GRN, Ah:BLU, Bh:CYN, Ch:YEL, Dh:MAG)
CAM_HLC	Parameter Set	8x 01 04 14 0p 0q FF	p:HLC level (0: OFF,1: Low,2: Mid,3:High) q: HLC mask level (0:OFF,1 to F: from low to high level)
CAM_WD	On	8x 01 04 3D 02 FF	WD On (WDR)
	Off	8x 01 04 3D 03 FF	WD off (WDR)
	VE on	8x 01 04 3D 06 FF	VE on
	Set Parameter	8x 01 04 2D 00 0q 0r 0s 00 00 00 00 FF	q: Display brightness level (0: Dark to 6: Bright) r: Brightness compensation selection (0: Very dark, 1: Dark, 2: Standard, 3: Bright) s: Compensation level (0: Low, 1: Mid, 2: High)

Command List (3/8)

Command List (4/8)

Command Set	Command	Command Packet	Comments
CAM_WD_Level	Direct	8x 01 04 7D 0p FF	p : WDR Level (0:Low, 1:Mid, 2:High)
CAM_ACE(*WW)	On	8x 01 04 1A 02 FF	ACE ON/OFF
	Off	8x 01 04 1A 03 FF	
CAM_ACELevel(*Ww)	Direct	8x 01 04 1A 10 0p FF	p : ACE Level (0 ~ 2)
CAM_Defog(*Ww)	On	8x 01 04 65 02 FF	Defog ON/OFF
	Off	8x 01 04 65 03 FF	
	Level	8x 01 04 65 10 0p FF	p : Defog Level (0:Low,1:mid,2:high)
	Mode	8x 01 04 65 20 0p FF	p : 0(Manual), 1(Auto)
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 (0~Fh)
CAM_HR	On	8x 01 04 52 02 FF	High Resolution Mode On/Off
	Off	8x 01 04 52 03 FF	
CAM_NR	Mode	8x 01 04 53 0p FF	p : 0 (Off), 1 ~ 3 (Low,Middle,High)
CAM_GAMMA	Direct	8x 01 04 5B 0p FF	p: Gamma setting (0:0.45, 1:0.55, 2:0.65, 3:0.75)
CAM_HighSensitivity	On	8x 01 04 5E 02 FF	High Sensitivity Mode On/Off
	Off	8x 01 04 5E 03 FF	
CAM_LR_Reverse	On	8x 01 04 61 02 FF	Mirror Image ON/OFF
	Off	8x 01 04 61 03 FF	
CAM_Freeze	On	8x 01 04 62 02 FF	Freeze Picture 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_MinShutter	On	8x 01 04 12 02 FF	pq:Minimum Shutter Position
	Off	8x 01 04 12 03 FF	
	Limit	8x 01 04 13 00 00 0p 0q FF	
CAM_PictureFlip	On	8x 01 04 66 02 FF	Picture Reverse On/Off (Rotate 180 °)
	Off	8x 01 04 66 03 FF	
CAM_ICR	Night	8x 01 04 01 02 FF	ICR Mode ON/OFF 02:On(Night),03:Off(Day)
	Day	8x 01 04 01 03 FF	
	Auto	8x 01 04 51 02 FF	ICR is changed automatically
	Ext-In	8x 01 04 51 05 FF	ICR is changed by external input
	Threshold	8x 01 04 21 00 00 0p 0q FF	pq : Theeshold level of Auto mode (0 ~14h)
	Gap,Margin	8x 01 04 21 10 00 0p 0q FF	pq : Threshold Margin of Night to Day (0 ~ 14h)
	Auto ICR Delay	8x 01 04 41 00 00 0p 0q FF	q : Auto mode delay (0:Low(1s),1:Mid(2s),2:High(20s))
	Ext-In Delay	8x 01 04 71 00 00 0p 0q FF	pq : Ext-In mode delay - 0 ~ FFh(255sec)
	Burst On	8x 01 04 72 02 FF	Burst On/Off
	Burst Off	8x 01 04 72 03 FF	
	IR Detection On	8x 01 04 6E 02 FF	IR Detection On/Off
	IR Detection Off	8x 01 04 6E 03 FF	
	IR Detection Level	8x 01 04 6E 10 0p FF	p:IR Detection Threshold Level (0 ~ 4h)

Command List (5/8)

Command Set	Command	Command Packet	Comments
CAM_AutoICRAlarm Reply	On	8x 01 04 31 02 FF	Auto ICR switching Alarm On/Off
	Off	8x 01 04 31 03 FF	
	(Reply)	y0 07 04 31 02 FF	ICR off -> On
		y0 07 04 31 03 FF	ICR On -> Off
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_StabilizerSet (*Ww)	Range	8x 01 04 54 00 0p FF	p : DIS Dzoom Range (0:10%, 1:20%, 2:30%)
	Filter	8x 01 04 54 10 0p FF	p : DIS Filter (0:Low,1:Middle, 2:High)
	Auto Center	8x 01 04 54 20 0p FF	p : Auto centering mode (0:OFF, 1:Half, 2:Full)
CAM_MEMORY	Reset	8x 01 04 3F 00 0p FF	p : Memory number (0 ~ 9)
	Set	8x 01 04 3F 01 0p FF	
	Recall	8x 01 04 3F 02 0p FF	
CAM_CUSTOM	Reset	8x 01 04 3F 00 7F FF	Starts in this mode at Power On Camera Factory Default value
	Set	8x 01 04 3F 01 7F FF	
	Recall	8x 01 04 3F 02 7F FF	
CAM_MemSave	Write	8x 01 04 23 0t 0p 0q 0r 0s FF	t : 00 ~ 07 (Address) Total 16Byte pqrs : 0000 ~ FFFFh (Data)
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_DispSel (*Ww)		8x 01 04 14 00 0p FF	Display Item On(1)/Off(0) p : bit[0] - ID, bit[1] - Title, bit[2] - Zoom Position bit[3] - System Message
CAM_MultiLineTitle	Title Set1	8x 01 04 73 1L 00 nn 00 qq rr 00 00 00 00 00 FF	L : Line Number (0 ~ Eh), nn : H-Position (0 ~ 27h), qq : Blink, rr : Opening Title
	Title Set2	8x 01 04 73 2L mm nn pp qq rr ss tt uu vv ww FF	L : Line Number (0 ~ Eh) mnpqrstuvw : Set of characters (1 ~ 10)
	Title Set3	8x 01 04 73 3L mm nn pp qq rr ss tt uu vv ww FF	L : Line Number (0 ~ Eh) mnpqrstuvw : Set of characters (11~ 20)
	Title Clear	8x 01 04 74 1p FF	Title Set clear (p: 0 ~ Eh, Fh= all line)
	On	8x 01 04 74 2p FF	Title display On/Off (0 ~ Eh, Fh= all line)
	Off	8x 01 04 74 3p FF	
CAM_MENUKey	MenuOpen	8x 01 04 16 0C FF	Open main menu
	Up	8x 01 04 16 01 FF	
	Down	8x 01 04 16 02 FF	
	Left	8x 01 04 16 04 FF	
	Right	8x 01 04 16 08 FF	
	Enter	8x 01 04 16 10 FF	into sub menu
	ESC	8x 01 04 16 20 FF	Escape menu

Command List (6/8)

Command List (7/8)

Command Set	Command	Command Packet	Comments
CAM_Continuous ZoomPosReply	On	8x 01 04 69 02 FF	Zoom Positon data continues output On/Off
	Off	8x 01 04 69 03 FF	
	(Reply)	y0 07 04 69 0p 0p 0q 0q 0q 0q FF	pp : D-Zoom Position * 00 : When D-Zoom Mode is Combine qqqq : Zoom Position
CAM_ZoomPosReply IntervalTimeSet	-	8x 01 04 6A 00 00 0p 0q FF	pq : Interval Time [Vertical Cycle]
CAM_Continuous FocusPosReply	On	8x 01 04 16 02 FF	Focus Position Data Continuous Output On/Off
	Off	8x 01 04 16 03 FF	
	(Reply)	y0 07 04 16 00 00 0p 0p 0p 0p FF	Pppp:Focus Position
CAM_FocusPosReply IntervalTimeSet	-	8x 01 04 1A 00 00 0p 0p FF	pp: Interval Time [Vertical Cycle]
CAM_RegisterValue		8x 01 04 24 mm 0p 0q FF	mm : Register No. (00, 52h, 60h, 72h, 73h, 90h, 91h, 9Ah, 9Bh) pq : Register Value
CAM_ColorEnhance	Parameter Set	8x 01 04 20 mm 00 pp qq rr ss tt uu FF	mm: Threshold level pp: Y fixed color for high-intensity qq: Cr fixed color for high-intensity rr: Cb fixed color for high-intensity ss: Y fixed color for low-intensity tt: Cr fixed color for low-intensity uu: Cb fixed color for low-intensity Each parameter setting 00h to 7Fh
	On	8x 01 04 50 02 FF	Color Enhancement On/Off
	Off	8x 01 04 50 03 FF	
CAM_ChromaSuppress		8x 01 04 5F 0p FF	pp: Chroma Suppress setting level
	CenterLineOff	8x 01 04 7C 03 FF	Center Line Display Off
	CenterLineOn	8x 01 04 7C 04 FF	Center Line Display On
CAM_KeyLock(*Ww)	Off	8x 01 04 17 00 FF	Key Lock ON/OFF
CAM_ColorGain	On Direct	8x 01 04 49 00 00 0p FF	p: Color Gain Setting 0h (60%) to Eh (200%)
CAM_IDWrite		8x 01 04 22 0p 0q 0r 0s FF	pqrs: Camera ID (0000 ~ FFFFh)
CAM_ColorHue	Direct	8x 01 04 4F 00 00 00 0p FF	p: Color Hue Setting 0h (-14 degrees) to Eh (+14 degrees)
CAM_MD	On	8x 01 04 1B 02 FF	Motion Detection On/Off
	Off	8x 01 04 1B 03 FF	
CAM_GammaOffset	Function Set	8x 01 04 1C 0m 0n 0p 0q 0r 0s FF	m : Displaymode n : Detection Frame Set (bit[0]:0, bit[1]:1, bit[2]:2, bit[3]:3) pq : Threshold Level (00~14h) rs : Interval Time set (00~FFh)
	Direct Set	8x 01 04 1E 00 00 00 0s 0t 0u FF	s: Polarity offset (0:is plus, 1:is minus) tu: Offset s=0 (00h to 40h) Offset s=1 (00h to 10h)
	Window Set	8x 01 04 1D 0m 0p 0q 0r 0s FF	m : Select Detection Frame Number (0,1,2,3) p : Start Horizontal Pos(00~0Eh) q : Start Vertical Pos (00 ~ 07) r : End Horizontal Pos (01 ~ 0Fh) s : End Vertical Pos (01 ~ 08h)
	MD Zoom Preset(*Ww)	8x 01 04 1E 02 FF	MD Zoom Preset On
		8x 01 04 1E 03 FF	MD Zoom Preset Off
	Set MD Zoom Pos(*Ww)	8x 01 04 1E 10 FF	Set MD Zoom preset to current zoom position
	Alarm (Reply)	y0 07 04 1B 0p FF	p : Detection Frame Set

Command List (8/8)

Command Set	Command	Command Packet	Comments
CAM_ExExpComp	Reset	8x 01 04 1F 0E 00 00 FF	Exposure compensation reset
	Up	8x 01 04 1F 0E 02 pp FF	Exposure compensation up pp: Step number pp=00h to 7Fh (However, 00h is the same operation as 01h.)
	Down	8x 01 04 1F 0E 03 pp FF	Exposure compensation down pp: Step number pp=00h to 7Fh (However, 00h is the same operation as 01h.)
	Direct	8x 01 04 1F 4E 00 00 0p 0q FF	Set the exposure compensation to the specified level pq: Level , pq=00h to FFh
CAM_ExAperture	Reset	8x 01 04 1F 02 00 00 FF	Aperture control reset
	Up	8x 01 04 1F 02 02 pp FF	Aperture control up pp: Step number pp=00h to 7Fh (However, 00h is the same operation as 01h.)
	Down	8x 01 04 1F 02 03 pp FF	Aperture control down pp: Step number pp=00h to 7Fh (However, 00h is the same operation as 01h.)
	Direct	8x 01 04 1F 42 00 00 0p 0q FF	Set the aperture control to the specified level pq: Level, pq=00h to FFh
CAM_ExAutoICR	Threshold (ON→OFF)	8x 01 04 1F 21 00 00 0p 0q FF	pq: ICR ON→OFF threshold level when Auto ICR , pq=00h to FFh
	On Level	8x 01 04 1F 21 01 00 0r 0s FF	pq: ICR OFF→ON threshold level when Auto ICR, pq=00h to 1Ch
CAM_ExColorGain	Direct	8x 01 04 1F 49 00 00 0p 0q FF	Color Gain Setting pq: Gain setting level pq=00h (0%) to FFh (200%)
CAM_ExColorHue	Direct	8x 01 04 1F 4F 00 00 0p 0q FF	Color Hue Setting pq: Phase setting level pq=00h (-14 degrees) to FFh (14 degrees)

Register Setting Command List (1/2)

Command Set	Command Packet	Value	Comments
Baud Rate	8x 01 04 24 00 00 0p FF	10	2400 bps
		11	4800 bps
		00	9600 bps
		01	19200 bps
		02	38400 bps
		03	57600 bps
		04	115200 bps
Monitoring Mode	8x 01 04 24 72 0p 0p FF	01	1080i/60
		02	Reserved
		03	NTSC Analog Output(Stop Digital Output)
		04	1080i/50
		05	PAL Analog Output(Stop Digital Output)
		06	1080p/30
		07	Reserved
		08	1080p/25
		09	720p/60
		0A	Reserved
		0B	Reserved
		0C	720p/50
		0D	Reserved
		0E	720p/30
		0F	Reserved
		10	Reserved
		11	720p/25
		12	Reserved
		13	1080p/60
		14	1080p/50
Output Enabling	8x 01 04 24 73 00 0p FF	01	Analog Output enabled
		02	Digital Output enabled
		03	Both Analog/Digital Output enabled
LVDS Mode	8x 01 04 24 74 00 0p FF	00	Single output
		01	Double output
Zoom Wide Limit	8x 01 04 24 50 0p 0p FF	00~FF	Wide Limit (0:Disabled)
Zoom Tele Limit	8x 01 04 24 51 0p 0p FF	00~FF	Tele Limit(0:Disabled)
D-Zoom Max	8x 01 04 24 52 0p 0p FF	00~EB	Max. digital zoom ratio = 256 ÷ (256-Value)
Stable Zoom	8x 01 04 24 53 00 0p FF	00	Off
		01	On
FocusTrace@ZoomDirect	8x 01 04 24 54 00 0p FF	00	Off
		01	On (Initial Setting : 01)
FocusOffset@DomeCover	8x 01 04 24 55 00 0p FF	00~FF	00:None to FF:Max.(Initial Setting : 00)
AE Parameter Change During VE On, Defog On	8x 01 04 24 58 00 0p FF	00	Off
		01	On

Register Setting Command List (2/2)

Command Set	Command Packet	Value	Comments
Auto Slow Shutter Limit	8x 01 04 24 59 00 0p FF	01	1/30
		02	1/15
		03	1/8
		04	1/4
		05	1/2
		06	1/1
Extended Normal Shutter	8x 01 04 24 5A 00 0p FF	00	OFF
		01	Allowed up to 1/30
		02	Allowed up to 1/15
		03	Allowed up to 1/8
		04	Allowed up to 1/4
		05	Allowed up to 1/2
		06	Allowed up to 1/1
Defog Limit	8x 01 04 24 5B 0p 0p FF	00~FF	pp:Defog level Low Limit
	8x 01 04 24 5C 0p 0p FF	00~FF	pp:Defog level Mid Limit
	8x 01 04 24 5D 0p 0p FF	00~FF	pp:Defog level High Limit
Extended Mode	8x 01 04 24 5F 00 0p FF	00	Off bit: 0 Exposure compensation Extended 256 levels On/Off bit: 1 Aperture Extended 256 levels On/Off bit: 2 Color Gain/Hue Extended 256 levels On/Off bit: 3 Auto ICR Off ⊒ On setting enable On/Off *For all of bit, 1 is to activate, 0 is Off

Inquiry Command List (1/7)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_PowerInq	8x 09 04 00 FF	y0 50 02 FF	On
CAM_ZoomPosInq	8x 09 04 47 FF	y0 50 0p 0q 0r 0s FF	pqrs : Zoom Position
CAM_ZoomPresetInq	8x 09 04 67 FF	Y0 50 00 00 0p 0q FF	pq : bit[0]:0 ~ bit[4]:4, (1:Set, 0:Unset)
CAM_DZoomModeInq	8x 09 04 06 FF	y0 50 02 FF	D-Zoom On
		y0 50 03 FF	D-Zoom Off
CAM_DZoomC/SModeInq	8x 09 04 36 FF	y0 50 00 FF	Combine Mode
		y0 50 01 FF	Separate Mode
CAM_DZoomPosInq	8x 09 04 46 FF	y0 50 00 00 0p 0q FF	pq : D-Zoom Position
CAM_FocusModeInq	8x 09 04 38 FF	y0 50 02 FF	Auto Focus
		y0 50 03 FF	Manual Focus
CAM_FocusPosInq	8x 09 04 48 FF	y0 50 0p 0q 0r 0s FF	pqrs : Focus Position
CAM_FocusNearLimitInq	8x 09 04 28 FF	y0 50 0p 0q 0r 0s FF	pqrs : Focus Near Limit
CAM_AFSensitivityInq	8x 09 04 58 FF	y0 50 02 FF	AF Sensitivity Normal
		y0 50 03 FF	AF Sensitivity Low
CAM_AFModeInq	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_AFStateInq(*Ww)	8x 09 04 26 FF	y0 50 0p FF	p : AF State - 0(Stop), 1(Run)
CAM_AFTimeSettingInq	8x 09 04 27 FF	y0 50 0p 0q 0r 0s FF	pq : Active Time, rs : Interval Time
CAM_IRCorrectionInq	8x 09 04 11 FF	y0 50 00 FF	Standard
		y0 50 01 FF	IR Light
CAM_CompScanThrsInq	8x 09 04 19 03 FF	y0 50 00 00 0p 0q FF	pq : White spot compensation Threshold (0~FF)
CAM_WBModeInq	8x 09 04 35 FF	y0 50 00 FF	Auto
		y0 50 01 FF	Indoor
		y0 50 02 FF	Outdoor
		y0 50 03 FF	One Push AWB (Preset)
		y0 50 04 FF	ATW
		y0 50 05 FF	Manual
		y0 50 06 FF	Outdoor Auto
		y0 50 07 FF	Sodium Lamp Auto
		y0 50 08 FF	Sodium Lamp
		y0 50 09 FF	Sodium Lamp Outdoor Auto
CAM_RGainInq	8x 09 04 43 FF	y0 50 00 00 0p 0q FF	pq : R Gain (0~14h)
CAM_BGainInq	8x 09 04 44 FF	y0 50 00 00 0p 0q FF	pq : B Gain (0~14h)
CAM_ChromaInq	8x 09 04 13 FF	y0 50 00 00 0p 0q FF	pq : Chroma level (0~14h)
CAM_AEModeInq	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_SlowShutterModeInq	8x 09 04 5A FF	y0 50 02 FF	Auto
		y0 50 03 FF	Off

Inquiry Command List (2/7)

Inquiry Command List (3/7)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_DefogInq	8x 09 04 65 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_DefogLevelInq	8x 09 04 65 10 FF	y0 50 0p FF	p : Defog Level (0:Low,1:mid,2:high)
CAM_DefogModeInq	8x 09 04 65 20 FF	y0 50 0p FF	p : Defog Mode - 0(Manual), 1(Auto)
CAM_ACEInq	8x 09 04 1A FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ACELevelInq	8x 09 04 1A 10 FF	y0 50 0p FF	p : ACE Level (0 ~ 2)
CAM_ApertureInq	8x 09 04 42 FF	y0 50 00 00 0p 0q FF	pq: Aperture Gain (0 ~ Fh)
CAM_ExpCompModeInq CAM_IRModeInq	8x 09 04 3E FF 8x 09 04 52 FF	y0 50 02 FF y0 50 03 FF	On Off
CAM_NRModeInq	8x 09 04 53 FF	y0 50 0p FF	p : 0 (Off), 1 ~ 3 (Low,Middle,High)
CAM_GammaInq	8x 09 04 5B FF	y0 50 0p FF	p: Gamma setting (0:0.45, 1:0.55, 2:0.65, 3:0.75)
CAM_HighSensitivityInq	8x 09 04 5E FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_LR_ReverseModeInq	8x 09 04 61 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_FreezeModeInq	8x 09 04 62 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_PictureEffectModeInq	8x 09 04 63 FF	y0 50 00 FF	Off (0~14h,Size)
CAM_HLCModeInq	8x 09 04 32 00 FF	y0 50 02 FF	p : HLC Mode-0(Off),1(On), 2(Night)
		y0 50 04 FF	Black & White
CAM_PictureFlipModeInq	8x 09 04 66 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ICRModeInq CAM_ICRStateInq	8x 09 04 01 FF	y0 50 02 FF	Night(ICR Status Night)
		y0 50 03 FF	Day (ICR Status Day) , 0x04(Hold)
CAM_AutoICRModeInq	8x 09 04 51 FF	y0 50 02 FF	Night , Auto Mode On
		y0 50 03 FF	Day , Auto Mode Off
		y0 50 04 FF	ICR is changed automatically by AGC gain
		y0 50 06 FF	ICR is changed by external input
CAM_ICRThresholdInq	8x 09 04 21 FF	y0 50 00 00 0p 0q FF	pq : Theeshold level of Auto mode (0 ~14h)
CAM_ICRMarginInq	8x 09 04 21 10 FF	y0 50 0p 0q FF	pq : Threshold Margin of Night to Day (0 ~ 14h)
CAM_AutoICRDelayInq	8x 09 04 41 FF	y0 50 00 00 0p 0q FF	q : Auto mode delay (0:Low(1s),1:Mid(2s),2:High(20s))
CAM_Ext-InICRDelayInq	8x 09 04 71 FF	y0 50 00 00 0p 0q FF	selection (0: Very dark, 1: Dark, 2: Standard, 3: Bright) pq : Ext-In mode delay - 0(0sec)~FFh(255sec)
CAM_BurstInq	8x 09 04 72 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
			s: Compensation level (00h: Low, 01h: Mid, 02h: High) tu: Always 0

Inquiry Command List (4/7)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_IRDetectionInq	8x 09 04 6E FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_IRDetectionLevelInq	8x 09 04 6E 10 FF	y0 50 0p FF	p : IR Detection Threshold Level (0 ~ 4)
CAM_AutoICRAlarmReply Inq	8x 09 04 31 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_MemoryInq	8x 09 04 3F FF	y0 50 pp FF	pp: Memory number recalled last
CAM_MemSaveInq	8x 09 04 23 0X FF	y0 50 0p 0q 0r 0s FF	X: 00h to 07h (Address) pqrs: 0000h to FFFFh (Data)
CAM_DisplayModeInq	8x 09 04 15 FF (8x 09 06 06 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_StabilizerRangeInq	8x 09 04 54 00 FF	y0 50 0p FF	p : DIS Dzoom Range (0:10%, 1:20%, 2:30%)
CAM_StabilizerFilterInq	8x 09 04 54 10 FF	y0 50 0p FF	p : DIS Filter (0:Low, 1:Middle, 2:High)
CAM_StabilizerAutoCInq	8x 09 04 54 20 FF	y0 50 0p FF	p : Auto centering mode (0:OFF, 1:Half, 2:Full)
CAM_DispSelInq	8x 09 04 14 00 FF	y0 50 0p FF	Display Item On(1)/Off(0) p : bit[0] - ID, bit[1] - Title, bit[2] - Zoom Position bit[3] - System Message
CAM_TitleDisplayModeInq	8x 09 04 74 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_MenuModeInq	8x 09 04 16 FF	y0 50 02 FF	OSD menu On
		y0 50 03 FF	OSD menu Off
CAM_BlueScreenModeInq	8x 09 05 20 FF	y0 50 0p FF	p : Blue Screen Display - 0(Off), 1(On)
CAM_MuteModeInq	8x 09 04 75 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_PrivacyPosInq(*Ww)	8x 09 04 76 mm FF	y0 50 0n 0p 0p 0q 0q 0r 0r 0s 0s FF	mm : Mask Number n : 0(Non-interlock Mode), 1(Interlock Mode) pp : X, qq : Y, rr : W, ss : H
CAM_PrivacyDisplayInq	8x 09 04 77 FF	y0 50 pp pp pp pp FF	pppppppp : Mask Display (0: OFF, 1: ON)
CAM_PrivacyColorInq (*Ww)	8x 09 04 78 FF	y0 50 pp pp pp pp qq rr FF	pppppppp : Mask Color Setting qq : Color Setting when 0 is selected rr : Color Setting when 1 is selected
CAM_PrivacyPanTiltInq	8x 09 04 79 FF	y0 50 0p 0p 0p 0q 0q 0q FF	ppp : Pan, qqq : Tilt

Inquiry Command List (5/7)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_PrivacyPTZInq	8x 09 04 7B mm FF	y0 50 0p 0p 0p 0q 0q 0q 0r 0r 0r 0r FF	mm : Mask Settings ppp : Pan, qqq : Tilt,rrrr : Zoom
CAM_PrivacyMonitorInq	8x 09 04 6F FF	y0 50 pp pp pp pp FF	pppppppp : Mask is displayed now
CAM_KeyLockInq	8x 09 04 17 FF	y0 50 02 FF	On
		y0 50 00 FF	Off
CAM_IDInq	8x 09 04 22 FF	y0 50 0p 0q 0r 0s FF	pqrs: Camera ID
CAM_VersionInq	8x 09 00 02 FF	y0 50 00 20 gg gg mn pq rs tu vw FF	gggg : Vender ID (no use) mnpq : Model ID *2361 (36X,1/1.9") rstu : ROM version *Version = rstu/100 vw : Socket Number (3) no use
CAM_ModelInq	8x 09 00 37 FF	y0 50 pp pp pp qq qq FF	pppppp : Model Code *Module Type : YY5C5Ah *Box Type : YY5C58h (YY : Custom. Code, standard model = 00) qqqq : Version
CAM_MDModeInq	8x 09 04 1B FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_MDFunctionInq	8x 09 04 1C FF	y0 50 0m 0n 0p 0q 0r 0s FF	m : Display mode, n : Detection Frame Set (bit[0]:0, bit[1]:1, bit[2]:2, bit[3]:3) pq : Threshold Level (00~ 14h) rs : Interval Time set (00 ~ FFh)
CAM_MDWindowInq	8x 09 04 1D 0m FF	y0 50 0p 0q 0r 0s FF	m : Select Detection Frame Number (0,1,2,3) p:Start Horizontal Pos(00~ 0Eh) q:Start Vertical Pos (00 ~ 07h) r:Stop Horizontal Pos(01~0Fh) s:Stop Vertical Position (01~08h)
CAM_MDZoomPresetInq	8x 09 04 1E FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ContinuousZoomPos ReplyModeInq	8x 09 04 69 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ZoomPosReplyInterval TimeInq	8x 09 04 6A FF	y0 50 00 00 0p 0p FF	pp: Interval Time
CAM_Continuous FocusPosReplyModeInq	8x 09 04 16 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_FocusReply IntervalTimeInq	8x 09 04 1A FF	y0 50 00 00 0p 0p FF	pp: Interval Time
CAM_RegisterValueInq	8x 09 04 24 mm FF	y0 50 0p 0p FF	mm : Register No. (00, 52h, 60h, 72h, 73h, 90h, 91h, 9Ah, 9Bh) pp : Register Value

Inquiry Command List (6/7)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_ColorEnhanceInq	8x 09 04 20 FF	y0 50 mm 00 pp qq rr ss tt uu FF	mm: Threshold level pp: Y fixed color for high-intensity qq: Cr fixed color for high-intensity rr: Cb fixed color for high-intensity ss: Y fixed color for low-intensity tt: Cr fixed color for low-intensity uu: Cb fixed color for low-intensity
	8x 09 04 50 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ChromaSuppressInq	8x 09 04 5F FF	y0 50 pp FF	pp: Chroma Suppress setting level
CAM_ColorGainInq	8x 09 04 49 FF	y0 50 00 00 00 0p FF	p: Color Gain Setting 0h (60%) to Eh (200%)
CAM_ColorHueInq	8x 09 04 4F FF	y0 50 00 00 00 0p FF	p: Color Hue Setting 0h (− 14 degrees) to Eh (+ 14 degrees)
CAM_TempInq	8x 09 04 68 FF	y0 50 00 00 0p 0q FF	pq: Lens Temperature
CAM_GammaOffsetInq	8x 09 04 1E FF	y0 50 00 00 00 0s 0t 0u FF	s: Polarity offset (0 is plus, 1 is minus) tu: Offset s=0 (00h to 40h) Offset s=1 (00h to 10h)
CAM_ExExpCompPosInq	8x 09 04 1F 4E FF	y0 50 00 00 0p 0q FF	pq: Exposure compensation level pq = 00h to FFh
CAM_ExApertureInq	8x 09 04 1F 42 FF	y0 50 00 00 0p 0q FF	pq: Aperture control level pq=00h to FFh
CAM_ExColorGainInq	8x 09 04 1F 49 00 FF	y0 50 0p 0q FF	pq: Gain setting level, pq: 00h (0%) to FFh (200%)
CAM_ExColorHueInq	8x 09 04 1F 4F 00 FF	y0 50 0p 0q FF	pq: Phase setting level pq: 00h (-14 degree) to FFh (+14 degree)
CAM_ExAutoICRThresholdInq	8x 09 04 1F 21 00 FF	y0 50 00 00 0p 0q FF	pq: ICR ON→OFF threshold level when Auto ICR pq = 00h to FFh
CAM_MinShutterInq	8x 09 04 12 FF	y0 50 02 FF	On
		y0 50 03 FF	Off

Inquiry Command List (7/7)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_MinShutterLimitInq	8x 09 04 13 FF	y0 50 00 00 0p 0q FF	pq: MinShutter Position
CAM_HLCInq	8x 09 04 14 FF	y0 50 0p 0q FF	p: HLC level (0:OFF,1: Low, 2: Mid, 3: High) q: HLC mask level (0: OFF, 1 to F: from low to high level)

Inquiry Command	Command Packet/ Inquiry Packet	Value	Comments
Baud Rate	8x 09 04 24 00 FF y0 50 00 0p FF	10	2400 bps
		11	4800 bps
		00	9600 bps
		01	19200 bps
		02	38400 bps
		03	57600 bps
		04	115200 bps
Monitoring Mode	8x 01 04 24 72 FF y0 50 0p 0p FF	01	1080i/60
		02	Reserved
		03	NTSC Analog Output(Stop Digital Output)
		04	1080i/50
		05	PAL Analog Output(Stop Digital Output)
		06	1080p/30
		07	Reserved
		08	1080p/25
		09	720p/60
		0A	Reserved
		0B	Reserved
		0C	720p/50
		0D	Reserved
		0E	720p/30
		0F	Reserved
		10	Reserved
		11	720p/25
		12	Reserved
		13	1080p/60
		14	1080p/50
Output Enabling	8x 01 04 24 73 FF y0 50 00 0p FF	01	Analog Output enabled
		02	Digital Output enabled
		03	Both Analog/Digital Output enabled
LVDS Mode	8x 01 04 24 74 FF y0 50 00 0p FF	00	Single output
		01	Double output
Zoom Wide Limit	8x 01 04 24 50 FF y0 50 0p 0p FF	00~FF	Wide Limit (0:Disabled)
Zoom Tele Limit	8x 01 04 24 51 FF y0 50 0p 0p FF	00~FF	Tele Limit(0:Disabled)
D-Zoom Max	8x 01 04 24 52 FF y0 50 0p 0p FF	00~EB	Max. digital zoom ratio = 256 ÷ (256-Value)
Stable Zoom	8x 01 04 24 53 FF y0 50 00 0p FF	00	Off
		01	On

Register Inquiry Command List (1/2)

Register Inquiry Command List (2/2)

Inquiry Command	Command Packet/ Inquiry Packet	Value	Comments
FocusTrace@ZoomDirect	8x 01 04 24 54 FF y0 50 00 0p FF	00	Off
		01	On (Initial Setting : 01)
FocusOffset@DomeCover	8x 01 04 24 55 FF y0 50 0p 0p FF	00~FF	00:None to FF:Max.(Initial Setting : 00)
AE Parameter Change During VE On, Defog On	8x 01 04 24 58 FF y0 50 00 0p FF	00	Off
		01	On
Auto Slow Shutter Limit	8x 01 04 24 59 FF y0 50 00 0p FF	01	1/30
		02	1/15
		03	1/8
		04	1/4
		05	1/2
		06	1/1
Extended Normal Shutter	8x 01 04 24 5A FF y0 50 00 0p FF	00	OFF
		01	Allowed up to 1/30
		02	Allowed up to 1/15
		03	Allowed up to 1/8
		04	Allowed up to 1/4
		05	Allowed up to 1/2
		06	Allowed up to 1/1
Defog Limit	8x 01 04 24 5B FF y0 50 0p 0p FF	00~FF	pp:Defog level Low Limit
	8x 01 04 24 5C FF y0 50 0p 0p FF	00~FF	pp:Defog level Mid Limit
	8x 01 04 24 5D FF y0 50 0p 0p FF	00~FF	pp:Defog level High Limit
Extended Mode	8x 01 04 24 5F FF y0 50 00 0p FF	00	Off bit: 0 Exposure compensation Extended 256 levels On/Off bit: 1 Aperture Extended 256 levels On/Off bit: 2 Color Gain/Hue Extended 256 levels On/Off bit: 3 Auto ICR Off ㄹ On setting enable On/Off *For all of bit, 1 is to activate, 0 is Off

Block Inquiry Command List (1/3)

Lens Control System Inquiry Command	
Command Packet : 8x 09 7E 7E 00 FF	
Inquiry Packet : y0 50 0p 0p 0p 0p 0q 0q 0r 0r 0r 0r 00 hh 0m FF	
pppp	Zoom Position
qq	Near Limit
rrrr	Focus Position
hh	[5] D-zoom Mode (0:Combine , 1:seprate) [4:3] AF Mode (0:Normal , 1:Interval , 2:Zoom Trigger) [2] AF Sensitivity (0:Low,1:Normal) [1] Digital Zoom (0:Off , 1:On) [0] Focus Mode (0:Manual , 1:Auto)
m	[3] Low Contrast Detection (0:No , 1:Yes) [2] Camera Memory Recall (0:Stopped , 1:Excuting) [1] Focus Command (0:Stopped , 1:Excuting) [0] Zoom Command (0:Stopped , 1:Excuting)

Camera Control System Inquiry Command	
Command Packet : 8x 09 7E 7E 01 FF	
Inquiry Packet : y0 50 0p 0p 0q 0q 0r 0s 0t hh mm nn 0u vv 0w FF	
pp	Rgain
qq	Bgain
r	WB Mode
s	Aperture Gain
t	Exposure Mode
hh	[5] High Resolution (0:Off , 1:On) [4] Wide-D (0:Off , 1:other than off) [3] Spot AE (0:Off , 1:On) [2] Backlight (0:0ff , 1:On) [1] Exposure comp(0:0ff , 1:On) [0] Slow shutter (0:Manual , 1:Auto)
mm	Shutter Position
nn	Iris Position
u	Gain Position
vv	Bright Position
w	Exposure Comp. position

Block Inquiry Command List (2/3)

Other Inquiry Command

Command Packet : 8x 09 7E 7E 02 FF			
Inquiry Packet : y0 50 0p qq rr 0s 00 00 0t 0t 0t 0t hh 00 00 FF			
p	[3] Auto ICR Alarm (0:Off , 1:On) [2] Auto ICR (0:Off , 1:On) [1] 0 [0] Power (0:Off , 1:On)	qq	[6] Stabilizer (0:Off , 1:On) [5] Stabilizer Hold (0:Off , 1:Hold) [4] ICR (0:Off , 1:On) [3] Freeze (0:Off , 1:On) [2] LR Reverse (0:Off , 1:On)
rr	[5] Privacy Zone (0:Off , 1:On) [4] Mute (0:Off , 1:On) [3] Title Display (0:Off , 1:On) [2] Display (0:Off , 1:On)	s	Picture Effect Mode [2] B&W (0:Off , 1:On) [1] Neg,Art (0:Off , 1:On)
tttt	Camera ID	hh	[4] Memory (0:Not provided , 1:Provided) [3] 0 [2] ICR (0:Not provided , 1:Provided) [1] Stabilizer (0:Not provided , 1:Provided) [0] System (0:1/60, 1/30 . 1:1/50,1/25)

Extended Function1 Inquiry Command			
Command Packet : 8x 09 7E 7E 03 FF			
Inquiry Packet : y0 50 0p 0p 0q 0q 0r 0r 0s 0t 0u vv hh mm nn FF			
pp	D-zoom Position	qq	AF Activation Time
rr	AF Interval Time	s	Spot AE Position(X)
t	Spot AE Position(Y)	u	[2] MD(0:Off,1:On), [0] E-Flip(0:Off,1:On)
vv	[6:3] color gain [2] Advanced privacy (0:Not provided , 1:Provided) [1] Reserved [0] E-Flip (0:Not provided , 1:Provided)	hh	AE Response
mm	[6:4] Gamma [3] High Sensitivity Mode(0:Off,1:On) [2:0] DNR Level	nn	[6:4] Chroma suppression [3:0] Gain limit

Block Inquiry Command List (3/3)

Extended Function1 Inquiry Command			
Command Packet : 8x 09 7E 7E 04 FF			
Inquiry Packet : y0 50 0p 0q 0r 0s 0t 0u 0v 00 00 00 00 00 00 FF			
p	WideD mode (0:Off,1:On , 2:VE On)	q	
r	Display brightness level setting	s	Brightness compensation selection

	0:Dark to 6:Bright		0:Very dark 1:Dark 2:Standard 3:Bright
t	Compensation level (0:Low , 1:Mid , 2:High)	u	[0]Defog (0:Off,1:On)
v	[1:0] Defog Level (0:Auto , 1:low ,2:Mid , 3:High)		

Extended Function1 Inquiry Command			
Command Packet : 8x 09 7E 7E 05 FF			
Inquiry Packet : y0 50 0p 00 00 00 00 00 00 00 00 00 00 00 00 FF			
p	Color Hue		Reserved

Command Setting Values (1/4)

Exposure Control

Shutter (Hex)

Shutter Speed	60/30 mode	50/25 mode
0	X4	X4
1	X2	X2
2	1/30	1/25
3	1/60	1/50
4	1/120	1/100
5	1/240	1/200
6	1/500	1/400
7	1/1000	1/800
8	1/2000	1/1600
9	1/4000	1/3200
A	1/8000	1/6400
B	1/16000	1/12800
C	1/30000	1/25600
D	1/60000	1/60000

IRIS (Hex)

Iris Value	Fno	Value	Fno
11	F1.6	07	F9.6
10	F2	06	F11
0F	F2.4	05	F14
0E	F2.8	00	CLOSE
0D	F3.4		
0C	F4		
0B	F4.8		
0A	F5.6		
09	F6.8		
08	F8		

Focus Near Limit	(Reserved)
1000	Over Inf
2000	20M
3000	10M
4000	5M
5000	3M
6000	2M
7000	1.5M
8000	1M (initial setting)
9000	60Cm
A000	30Cm
B000	20Cm
C000	10Cm
D000	6Cm
E000	3Cm
F000	1Cm

Optical Zoom Ratio	Optical Zoom Position Data
1x	0000
2x	15BF
3x	1F7D
4x	255E
5x	2970
6x	2C8E
7x	2F12
8x	3129
9x	3300
10x	34AB
11x	3627
12x	3789
13x	38C6
14x	39DF
15x	3ADD
16x	3BB7
17x	3C6C
18x	3D0F
19x	3D8E
20x	3E04
21x	3E5F
22x	3EB1
23x	3EF9
24x	3F26
25x	3F54
26x	3F81
27x	3F93
28x	3FA5
29x	3FB7
30x	3FC9
31x	3FD3
32x	3FDC
33x	3FE5
34x	3FEE
35x	3FF7
36x	4000
37x	
38x	

Zoom Ratio & Zoom Position (Hex)

Digital Zoom Combine Mode (Hex)

Digital Zoom Ratio	Digital Zoom Position Data
1x	4000
2x	6000
3x	6A80
4x	7000
5x	7300
6x	7540
7x	76C0
8x	7800
9x	78C0
10x	7980
11x	7A00
12x	7AC0
13x	7B40
14x	7B80
15x	7BC0
16x	7C00

Bright (Hex)

Step	Iris	Gain
1B	F1.6	A
1A	F1.6	9
19	F1.6	8
18	F1.6	7
17	F1.6	6
16	F1.6	5
15	F1.6	4
14	F1.6	3
13	F1.6	2
12	F1.6	1
11	F1.6	0
10	F2	0
0F	F2.4	0
0E	F2.8	0
0D	F3.4	0
0C	F4	0
0B	F4.8	0
0A	F5.6	0
09	F6.8	0
08	F8	0
07	F9.6	0
06	F11	0
05	F14	0
00	CLOSE	0

Character Map #1

Code	Character	Code	Character	Code	Character	Code	Charactor
00	space	21	A	42	b		
01	!	22	B	43	c		
02	"	23	C	44	d		
03	#	24	D	45	e		
04	$	25	E	46	f		
05	%	26	F	47	g		
06	&	27	G	48	h		
07	"	28	H	49	i		
08	(	29	I	4a	j		
09	)	2a	J	4b	k		
0a	*	2b	K	4c	l		
0b	+	2c	L	4d	m		
0c	,	2d	M	4e	n		
0d	-	2e	N	4f	o		
0e	.	2f	O	50	p		
0f	/	30	P	51	q		
10	0	31	Q	52	r		
11	1	32	R	53	s		
12	2	33	S	54	t		
13	3	34	T	55	u		
14	4	35	U	56	v		
15	5	36	V	57	w		
16	6	37	W	58	x		
17	7	38	X	59	y		
18	8	39	Y	5a	z		
19	9	3a	Z	5b	{		
1a	:	3b	[	5c	|		
1b	;	3c	\	5d	}		
1c	<	3d	]	5e	~		
1d	=	3e	^				
1e	>	3f	_				
1f	?	40	`				
20	@	41	a				

Character Map #2

Code	Character	Code	Character	Code	Character	Code	Character
00	A	21	4	42			
01	B	22	5	43			
02	C	23	6	44			
03	D	24	7	45			
04	E	25	8	46			
05	F	26	9	47			
06	G	27	0	48			
07	H	28		49	"		
08	I	29		4a	:		
09	J	2a		4b	'		
0a	K	2b		4c	.		
0b	L	2c		4d	,		
0c	M	2d		4e	/		
0d	N	2e		4f	-		
0e	O	2f		50	*		
0f	P	30		51			
10	Q	31		52			
11	R	32		53			
12	S	33		54			
13	T	34		55			
14	U	35		56			
15	V	36		57			
16	W	37		58			
17	X	38		59			
18	Y	39		5a			
19	Z	3a		5b			
1a	&	3b		5c			
1b		3c		5d			
1c	?	3d		5e			
1d	!	3e					
1e	1	3f					
1f	2	40					
20	3	41	$				