5-074-417-**11**(1)

Color Camera Module

Technical Manual Software version 0100

Aegis Electronic Group
www.aegiselect.com

FCB-ER9100

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Features

- **Imager**
  This camera has a 1/2.8" STARVIS™ CMOS (complementary metal-oxide semiconductor) image sensor (approx. 8.39 million effective pixels) and outputs high-definition and high-quality images.
- **ISP**
  Using the image signal processor (ISP), the following images can be obtained.
  – 4K 60 fps/Full HD 60 fps output image
  The following functions are provided.
  – Noise Reduction (NR)
  – Wide Dynamic Range Mode (Wide-D), Visibility Enhancer (VE), and Defog
  – Super+ Image Stabilizer
- **Lens**
  4K lens of brightness with 10× optical magnification, wide angle and F1.8 is provided in this camera. (optical + digital = 120×)

With consideration given environmental protection, this module incorporates lead-free and halogen-free circuit boards.

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Precautions

Software

Use of the demonstration software developed by Sony Corporation or use of the software with customer developed application software may damage hardware, the application program or the camera. Sony Corporation is not liable for any damages under these conditions.

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 conditions:

- Extremely hot or cold places (operating temperature –5 ˚C to +45 ˚C (23 ˚F to 113 ˚F))
- Close to generators of powerful electromagnetic radiation such as radio or TV transmitters
- Where it is subject to strong vibration
- Do not directly shoot laser beams.

When the unit is stored for a long time, take the unit out from the carton, and store it in an environment avoiding high temperature or high humidity as well as dust, etc.

Care of the unit

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

Other

- Design and specifications are subject to change without notice.
- Do not apply excessive voltage. (Use only the specified voltage.) Otherwise, you may get an electric shock or a fire may occur.
- The CMOS image sensor and IC included in this camera may break if exposed to static electricity. When directly handling this camera, use an antistatic strap, spread a conductive sheet or similar item under your workbench and take measures to eliminate static electricity.
- In case of abnormal operation, contact your authorized Sony dealer or the store where you purchased the product.

Handling precautions

- When handling this unit, be careful not to apply an excessive load to all portions of the unit except for the sheet-metal cover. Otherwise, it may result in a failure.
- This unit is designed to be built in the housing. Therefore, take measures to prevent the unit from receiving the intense light such as sunlight directly from the direction other than the front side. Otherwise, it may cause the image quality degradation.

Phenomena specific to CMOS image sensors

The following phenomena that may appear in images are specific to CMOS 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 or the subject is moved.

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 gain (sensitivity)
- when operating in Slow-Shutter mode

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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.

Phenomena specific to illumination and self-luminous subjects

- Flickering may occur under unstable lighting.
- When shooting traffic lights or similar signals that use LEDs, areas that should be lit may appear dim or as if they were not lit at all.
- Be careful when installing this unit in places affected by the fluorescent light reflections or window reflections.

About the trademark

STARVIS™ is a trademark of Sony Group Corporation or its affiliates.

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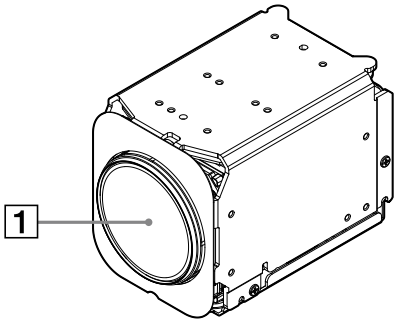
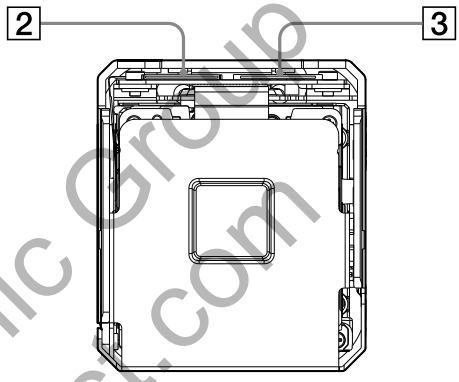
Locations of Controls

Front



Back



1 **Lens**

2 **Maintenance connector**

* Do not connect here, this is for maintenance purpose.

3 **Digital output connector**

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Basic Functions

Overview of Functions

About VISCA Command processing

It is possible to accept 1 VISCA command per 1 V cycle. It takes a minimum of 1 V cycle time to return an Acknowledge/Completion for a VISCA command. The duration of the 1 V cycle varies according to the monitoring mode. See the table below.

Monitoring Mode			
2160p/60 2160p/59.94 1080p/60 1080p/59.94 1080i/60 1080i/59.94 720p/60 720p/59.94 480p/59.94 (Test Mode)	2160p/30 2160p/29.97 1080p/30 1080p/29.97 720p/30 720p/29.97	2160p/50 1080p/50 1080i/50 720p/50 576p/50 (Test Mode)	2160p/25 1080p/25 720p/25
1/60 sec	1/30 sec	1/50 sec	1/25 sec

In general

- **Power On/Off (Standby): CAM_Power**
  Powers the camera On and Off (Standby).
  When the power is Off (Standby), the screen is set to a non-displayed state, but the camera is capable of accepting some VISCA commands.
  See "Mode Condition" (page 30) for the accepted commands.

- **I/F Clear: IF_Clear**
  Clears the Command buffer of the camera and aborts any commands currently being executed.

- **Address Set: AddressSet**
  VISCA is a protocol, which normally supports a daisy chain of up to seven connected cameras via RS-232C interface. In such cases, the address set command can be used to assign addresses from 1 to 7 to each of the seven cameras, allowing you to control the seven cameras with the same personal computer.
  Although the FCB camera does not support the direct connection of cameras in a daisy chain, be sure to use the address set command to set the address whenever a camera is connected for the first time due to the constraints of the VISCA protocol.

- **ID Write: CAM_IDWrite**
  Sets the camera ID.

- **Mute: CAM_Mute**
  Blanks the screen and sends out a synchronizing signal.

- **Lens Initialize: CAM_Initialize (Lens)**
  Initializes the zoom and focus of the lens. Even when power is turned on, it initializes the zoom and the focus.

Video Output

This camera can output three types of videos, 4K output / FHD output / HD output.

- **4K output / FHD output / HD output**

The following Monitoring Mode videos can be output.

Monitoring Mode			
2160p/60 2160p/59.94 1080p/60 1080p/59.94 1080i/60 1080i/59.94 720p/60 720p/59.94 480p/59.94 (Test Mode)	2160p/30 2160p/29.97 1080p/30 1080p/29.97 720p/30 720p/29.97	2160p/50 1080p/50 1080i/50 720p/50 576p/50 (Test Mode)	2160p/25 1080p/25 720p/25

Note

Functions such as image stabilizer and Wide-D are not available in 480p and 576p due to the test mode.

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Zoom: CAM_Zoom

The zoom function contains 2 functions, optical zoom and digital zoom.

- **Optical zoom**
  The function to change the focal distance and enlarge images optically by moving the zoom lens.
  This can zoom up to 10×.
  Optical zoom has the following modes.
  - **Standard Mode**
    Move as fast as possible in the Wide direction or the Tele direction.
  - **Variable Mode**
    Move at a specified speed in the Wide direction or the Tele direction.
  - **Direct Mode**
    Setting the zoom position enables quick movement to the designated position.

Note

After the zoom operation starts in Standard Mode or Variable Mode, the zoom operation stops when Stop Command is sent. When Stop Command is not sent, the zoom operation stops after reaching the Wide end or the Tele end.

- **Digital zoom: CAM_DZoom**
  The function that zooms into images digitally by cropping the center part of an image captured by the imager and then enlarging it.
  When the zoom diameter goes up, the resolution will go down. This can zoom up to 12×.
  Digital zoom has the following modes.
  - **Variable Mode**
    Move at a specified speed in the Wide direction or the Tele direction.
  - **Direct Mode**
    Setting the zoom position enables instant movement to the designated position.

  You can also set how you apply the digital zoom.
  - **Digital zoom On/Off**
    Digital zoom is not available when Off is set.
  - **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 within any level of optical magnification.

Note

When the Digital Zoom is operated in the Direct Mode, the Direct Zoom Position of the Inquiry Command is not immediately reflected.
Wait before reading the position.
When using Slow Shutter, wait for more than twice the shutter speed.
When not using Slow Shutter, wait for 0.1 seconds or more.

About Continuous Zoom Position Reply

If Continuous Zoom Position Reply is set to On by command, the camera outputs zoom position data whenever the zoom position changes.

Focus: CAM_Focus

Focus has the following modes.

- **Auto Focus Mode: CAM_AFMode**
  AF (Auto Focus) adjusts the focus to the high-frequency components of the video signal, specifically areas with high contrast, within the measurement frame at the center of the screen. The minimum focus distance is 10 mm at the Wide end and 800 mm at the Tele end.

Note

The initial value of the Near Limit setting is 35 cm. Therefore, you cannot focus on a distance less than 35 cm in the default status.

  - **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. The time intervals for AF movements and for the timing of the stops can be set in one-second increments using the Active/Interval Time Command.
  - **Zoom Trigger Mode**
    When zoom position is changed, it becomes AF mode during the pre-set value. Then it stops.

- **AF Sensitivity: CAM_AFSensitivity**
  The switching of AF sensitivity can be set.
  - **Normal**
    Reaches the highest focus speed quickly. Use this when shooting a subject that moves frequently. The Normal mode is generally the appropriate mode.
  - **Low**
    Improves the stability of the focus. Even when the brightness changes slightly, AF is less likely to operate when it is not needed and a stable image can be obtained.

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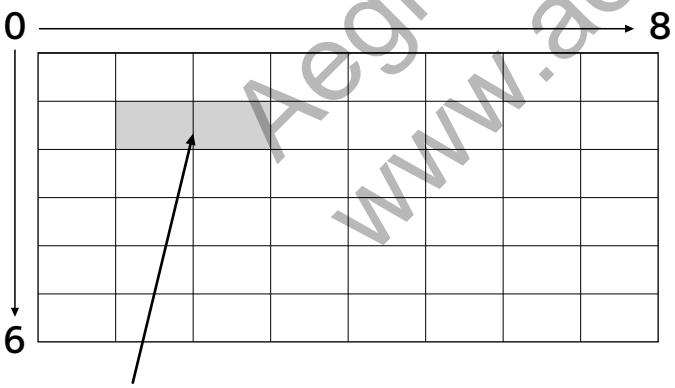
- **Manual Focus Mode**
  Manual Focus has both a Standard Mode and a Variable Mode. Standard Mode focuses at a fixed rate of speed. Variable Mode has eight speed levels.

Note

After the focus movement starts in Standard Mode or Variable Mode, the focus movement stops when Stop Command is sent. When Stop Command is not sent, the focus movement stops after reaching the Near end or Far end.

- **One Push AF**
  When sending a One Push Trigger command in Manual Focus Mode, the lens moves to focus on the subject. After that, it will convert to the normal Manual Focus Mode.
  There are two kinds of One Push Trigger commands.
  - **One Push Trigger**
    Performs the same operation as AF and focuses on the subject.
  - **Full Scan One Push Trigger**
    Performs a Full Scan (moves the lens to the whole area from the Near end to the Far end) and focuses on the subject.
    Unlike the One Push Trigger, the time to focus is longer because of full scan operation, but you can focus more accurately.

- **Spot Focus: CAM_SpotFocus**
  Spot Focus allows you to focus on a specific area.
  Used when it is difficult to focus on the subject using a normal AF mode.
  The focus area can be selected with a resolution of 6 blocks vertically and 8 blocks horizontally. The Spot Focus frame can be displayed in the video output.



To specify this part, specify it at the starting point (1,1) and the terminating point (3,2) or at the starting point (1,2) and the terminating point (3,1).
Be sure to specify at the diagonal position.

Note

The Spot Focus frame cannot be displayed in the video output when digital zoom is used.

About Continuous Focus Position Reply

If Continuous Focus Position Reply is set to On by command, the camera outputs focus position data whenever the lens is moved.

Focus Limiter

This function limits the range of the shooting distance to focus on the subject.

- Near Limit Setting: CAM_Focus (Near Limit)
  Limits the range of the focus movement on the Near end.
  Can be set in a range from 1000h (∞) to F000h (10 mm).
- Far Limit Setting: CAM_RegisterValue (65h, 66h)
  Limits the range of the focus movement on the Far end.
  You can set Far Limit in the register setting. This can be set in a range from 10h (∞) to 50h (1.2 m).

Notes

- Near Limit and Far Limit cannot be set at the same time. Far Limit has priority if both are set.
- Far Limit and Spot Light Avoidance cannot be set at the same time.
- Regardless of the focus modes, the lens does not move to the Near end/Far end beyond the position limited with Near Limit/Far Limit settings.

AF Status: CAM_AFStatusInq

You can confirm the following AF movement statuses.

- **Completion:** The AF movement is completed.
- **Evacuation:** If the camera cannot focus on a high contrast object, the lens will move to the Inf position automatically. This is called evacuation.
- **In operation:** The AF control is in operation.
- **Other than AF:** Settings other than AF are applied.

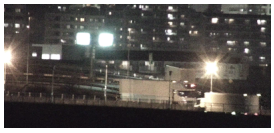
Spot Light Avoidance: CAM_RegisterValue (20h)

This function prevents very bright subjects such as spotlights from affecting AF operation. When shooting a subject with spotlights such as outdoor lights, AF/One Push AF may not to focus.
For example, this symptom is more likely to occur when shooting outdoors at night. The Spot Light Avoidance function makes it easier to focus with AF/One Push AF in such situations.

- **Example of a subject that can be focused on by the Spot Light Avoidance**

Spot Light Avoidance Off

Spot Light Avoidance On



Note

Depending on the zoom ratio and the brightness of the spotlight, this function may not be effective.

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White Balance (WB): CAM_WB

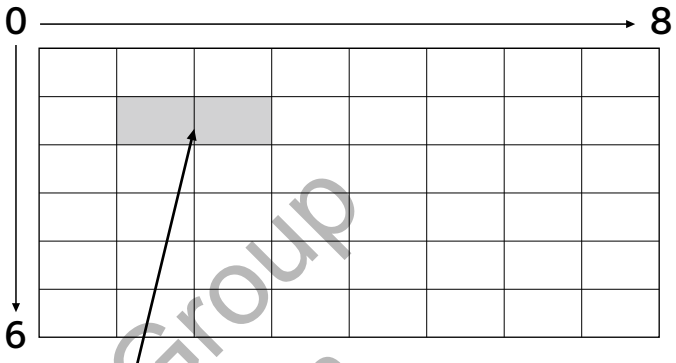
White Balance has the following modes.

- **Auto**
  This mode computes the white balance value output using color information from the entire screen. Automatically adjusts natural color reproduction. (Approximately 2500K to 7500K)
- **ATW**
  Automatically adjusts color reproduction to be closer to the original colors. You can avoid the influence of light source colors such as illumination. (Approximately 2000K to 10000K)
- **Indoor**
  Adjusts the white balance to one suitable for indoor shooting. (Approximately 3200K)
- **Outdoor**
  Adjusts the white balance to one suitable for outdoor shooting. (Approximately 5800K)
- **One Push WB**
  Once the conditions for illuminating a subject are set, the One Push WB mode force tracks the white balance and shoots the subject in the set conditions. The subject is shot in natural color because the colors are not influenced by the lighting conditions of the subject's surroundings. To set to this mode, send a One Push Trigger by shooting the target subject. One Push WB data is lost when the power is turned off. If the power is turned off, reset One Push WB.
- **Manual**
  This is a mode that enables you to manually set the control of R and B gain up to 256 steps.
- **Outdoor Auto**
  This is an auto white balance mode specifically for outdoors. It allows you to capture images with natural white balance in the morning and evening. (Approximately 4500K to 8000K)
- **Sodium Vapor Lamp Auto**
  This is an auto white balance mode that is compatible with sodium vapor lamps. Sodium (Approximately 1800K to 2400K) + Auto (Approximately 2500K to 7500K)
- **Sodium Vapor Lamp**
  This is a fixed white balance mode specifically for sodium vapor lamps. (Approximately 2200K)
- **Sodium Vapor Lamp Outdoor Auto**
  This is an auto white balance mode specifically for outdoors, which is compatible with sodium vapor lamps. Sodium (Approximately 1800K to 2400K) + Outdoor (Approximately 5800K Base Mode)

Note

High-pressure sodium lamps are supported. Proper white balance may not be captured for some subjects when using low-pressure sodium lamps.

- **Spot AWB: CAM_SpotAWB**
  Spot AWB allows you to focus on a specific area and instantly adjust the white balance.
  The AWB area can be selected with a resolution of 6 blocks vertically and 8 blocks horizontally. The Spot AWB frame can be displayed in the video output.



To specify this part, specify it at the starting point (1,1) and the terminating point (3,2) or at the starting point (1,2) and the terminating point (3,1).
Be sure to specify at the diagonal position.

Note

The Spot AWB frame cannot be displayed in the video output when digital zoom is used.

- **White Balance Speed Adjustment: CAM_WBSpeed**
  You can adjust the White Balance convergence speed in ±2 levels. This function is available only when the auto white balance mode is selected. The larger the value is, the faster the convergence becomes. The smaller the value is, the slower the convergence becomes.

Notes

- This function is available when White Balance is set to Auto, ATW, Outdoor Auto, Sodium Vapor Lamp Auto or Sodium Vapor Lamp Outdoor Auto.
- White balance speed adjustment does not operate but converges at the fastest speed when the Spot AWB mode is On.

- **White Balance Offset: CAM_WBOffset**
  You can adjust the convergent point of White Balance. This function is available only when the auto white balance mode is selected. When the value becomes larger, the convergent point moves to the red direction. When the value becomes smaller, the convergent point moves to the blue direction.

Note

This function is available when White Balance is set to Auto, ATW, One Push WB, Outdoor Auto, Sodium Vapor Lamp Auto or Sodium Vapor Lamp Outdoor Auto.

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Auto Exposure Mode (AE): CAM_AE

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

- **Full Auto**
  Shutter Speed, Iris and Gain can be set automatically.
- **Gain Limit Setting: CAM_Gain**
  The gain limit can be set in Full Auto, Shutter Priority, Iris Priority, and Spot AE. Use this setting when you want to obtain image in which signal-to-noise ratio is particularly important.
- **Shutter Priority: CAM_Shutter**
  Adjust with Variable Shutter Speed (1/1 to 1/10,000 seconds, 16 high-speed steps plus 6 low-speed steps), Auto Iris and Gain.
- **Iris Priority: CAM_Iris**
  Adjust with Variable Iris (F1.8 to F14, 13 steps), Auto Shutter Speed and Gain.

Note

Set the Wide end converted value. For the values corresponding to the zoom position, see page 57.

- **Manual**
  Adjust with Variable Shutter Speed, Iris and Gain.

AE – Shutter Priority

The shutter speed can be set freely by the user to a total of 22 steps – 16 high-speed steps and 6 low-speed steps. When the slow shutter is set, the shutter speed can be adjusted according to the brightness of the subject. When using a slow shutter, the responsiveness of AF/AE/AWB will be reduced. In high-speed shutter mode, the shutter speed can be set up to 1/10,000 seconds. Iris and Gain are set automatically.

Data	59.94/29.97 mode	50/25 mode
15	1/10000	1/10000
14	1/6000	1/6000
13	1/4000	1/3500
12	1/3000	1/2500
11	1/2000	1/1750
10	1/1500	1/1250
0F	1/1000	1/1000
0E	1/725	1/600
0D	1/500	1/425
0C	1/350	1/300
0B	1/250	1/215
0A	1/180	1/150
09	1/125	1/120
08	1/100	1/100
07	1/90	1/75
06	1/60	1/50
05	1/30	1/25
04	1/15	1/12
03	1/8	1/6
02	1/4	1/3
01	1/2	1/2
00	1/1	1/1

AE – Iris Priority

The iris can be set freely by the user to 13 steps between F1.8 and F14. The gain and shutter speed are set automatically.

Data	Setting value	Data	Setting value
11	F1.8	0A	F5.6
10	F2	09	F6.8
0F	F2.4	08	F8
0E	F2.8	07	F9.6
0D	F3.4	06	F11
0C	F4	05	F14
0B	F4.8		

Note

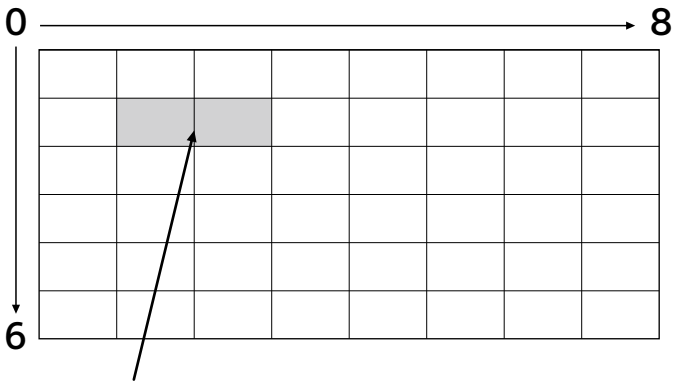
Set the Wide end converted value. For the values corresponding to the zoom position, see page 57.

Manual

The shutter speed (22 steps), iris (F1.8 to Close, 14 steps) and gain (15 steps) can be set freely by the user.

Spot AE: CAM_SpotAE

In Full Auto AE, the level for the entire screen is computed and the optimum Shutter Speed, Iris and Gain levels are determined. In Spot AE, a particular section of the subject can be designated, and then the designated portion can be weighted and computed so that Shutter Speed, Iris and Gain can be optimized to obtain an image.
For example, in an image with a lot of movement and with varying levels of brightness, portions without much change can be designated as such a “spot,” and changes to the screen can be minimized in that area.
The AE area can be selected with a resolution of 6 blocks vertically and 8 blocks horizontally. The Spot AE frame can be displayed in the video output.



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Be sure to specify at the diagonal position.

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Notes

- Wide-D/HLC/Backlight Compensation does not work at the same time with Spot AE.
- The Slow AE Response function does not work while the Spot AE mode is turned on.
- The Spot AE frame cannot be displayed in the video output when digital zoom is used.

Exposure Compensation: CAM_ExpComp

Exposure Compensation is a function to adjust the brightness in AE mode. Based on the standard brightness "0", you can set the brightness by 1.5 dB per step.

Data	Step	Setting value
0E	+7	+10.5 dB
0D	+6	+9 dB
0C	+5	+7.5 dB
0B	+4	+6 dB
0A	+3	+4.5 dB
09	+2	+3 dB
08	+1	+1.5 dB
07	0	0 dB
06	−1	−1.5 dB
05	−2	−3 dB
04	−3	−4.5 dB
03	−4	−6 dB
02	−5	−7.5 dB
01	−6	−9 dB
00	−7	−10.5 dB

Slow AE Response (Auto Exposure Response): CAM_AE_Response

This function allows you to reduce the exposure convergence speed. Usually, the camera is set up so that the optimum exposure can be obtained within about 1 second. The exposure convergence speed can be lengthened from approx. 1 second to approx. 10 minutes.
For example, with the normal setting (about 1 second), if the headlights of a car are caught by the camera, the camera automatically adjusts the exposure so that it can shoot a high-intensity subject (in this case, the headlights). As a result, images around the headlights, that is, the rest of the subject, except the headlights, becomes relatively dark, and poorly distinguished. However, using the Slow AE Response function makes the response time longer. As a result, even if the camera catches a high-intensity subject (e.g., headlights) for a moment, you can still easily distinguish the portions of the image surrounding the headlights.

Note

The Slow AE Response function does not work while the Spot AE mode is turned on.

Aperture Control: CAM_Aperture

This is a function to adjust the edge enhancement of subjects. When the subject consists of text or similar elements, this function may help by making it sharper.

- **Auto**
  The edge enhancement can be adjusted between 16 steps.
  Items which can be set by Manual (such as Bandwidth, Crispening, etc.) are adjusted automatically.

- **Manual**
  The edge enhancement can be adjusted between 16 steps.
  In addition to enhancement, detailed settings (such as Bandwidth, Crispening, etc.) can be adjusted.
  - **Bandwidth**
    Set the bandwidth of the signal to enhance the edge.
  - **Crispening**
    Minimize the noise increase by not adding edge enhancement to the signal below the threshold.
  - **B/W Balance**
    Set the balance of the black edge for low brightness and white edge for high brightness.
  - **Limit**
    Set the maximum value for edge enhancement.
  - **High Light Detail**
    Set the edge enhancement value for the bright subject with high-intensity background.

Backlight Compensation: CAM_BackLight

When the background of the subject is too bright and the subject is dark due to shooting in the AE mode, back light compensation will make the subject appear clearer. This function operates only when AE is set to Full Auto.

Notes

- Wide-D/HLC/Backlight Compensation/AE (Shutter Priority / Iris Priority / Manual) / Spot AE do not work at the same time.
- When shooting with the backlight compensation, the AE/AWB convergence speed may be reduced because shooting with the compensation takes longer than normal shooting.

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Wide Dynamic Range Mode (Wide-D): CAM_WD

This is a function to divide an image into several blocks and to correct 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).

- **About Wide-D Set Parameter**
  (Command: 8x 01 04 2D 00 0q 0r 0s 00 00 00 00 FF)

  q: Display brightness
  (0: Dark to 6: Bright)
  The brightness and the darkness can be adjusted to seven levels. The normal brightness is set to 3.

  r: Brightness compensation
  (0: Darker areas, 1: Dark areas, 2: Standard, 3: Bright areas)
  Corrects the brightness to improve the visibility of the area you set.

  s: Compensation level
  (0: Low, 1: Mid, 2: High)
  The compensation of the brightness, which you select from the parameter, can be set to three levels.

Notes

- When the Wide-D is On, false colors may appear in some parts of the image. This phenomenon is unique to Wide-D, and is not an indication of a camera malfunction.
- When the Wide-D mode is changed, the image may be temporarily distorted.
- Wide-D/HLC/Backlight Compensation/Spot AE do not work at the same time.
  Wide-D and VE do not work at the same time.
- The three types of functions: Wide-D, OSD (Title, PZM, Display), 3D NR do not work at the same time. For example, when OSD and 3D NR are On and Wide-D is turned on, 3D NR is automatically turned off. At this time, the NR mode will automatically switch to 2D/3D independent setting mode. For details, see “State transitions of the exclusive control function” (page 33).
- The Wide Dynamic Range Mode (Wide-D) function will be available with the firmware version 0200 or later.
- The set parameters of Wide-D and VE are common.

Visibility Enhancer (VE): CAM_VE

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

- **About VE Set Parameter**
  (Command: 8x 01 04 2D 00 0q 0r 0s 00 00 00 00 FF)

  q: Display brightness
  (0: Dark to 6: Bright)
  The brightness and the darkness can be adjusted to seven levels. The normal brightness is set to 3.

  r: Brightness compensation
  (0: Darker areas, 1: Dark areas, 2: Standard, 3: Bright areas)
  Corrects the brightness to improve the visibility of the area you set.

  s: Compensation level
  (0: Low, 1: Mid, 2: High)
  The compensation of the brightness, which you select from the parameter, can be set to three levels.

Note

Wide-D and VE do not work at the same time.

Defog: CAM_Defog

When the surrounding area of the subject is foggy and low contrast, the defog mode will make the subject appear clearer.
For this function, you can select from Off, Low, Mid and High.

HLC (Highlight Compensation): CAM_HLC

When a strong spotlight is detected, AE is adjusted and the light area is masked if necessary.
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.

- **About HLC Set Parameter**
  (Command: 8x 01 04 14 0p 0q FF)

  p: HLC level
  (0: Off, 1: Low, 2: Mid, 3: High)
  Set the exposure compensation amount. As the exposure compensation becomes stronger, the visibility of dark areas improves, but bright areas become even brighter.

  q: HLC mask level
  (0: Off, 1: Low, 2: Mid, 3: High)
  Set the mask level for the high-intensity part. By increasing it, you can reduce the brightness of high-luminance areas.

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Note

Wide-D/HLC/Backlight Compensation/Spot AE do not work at the same time.

Minimum Shutter: CAM_MinShutter

When the subject becomes dark, the shutter speed becomes slow, and then the gain is increased. This function puts a limit on the shutter speed.
It prevents the camera shake when you shoot a moving subject in a dark place.

Noise Reduction (NR): CAM_NR

This function removes noise (fixed pattern noise, random noise, etc.) to provide clearer images.
The functions of both 2D NR (Noise reduction within frames) and 3D NR (Noise reduction between frames) are provided. When the 2D NR level is increased, the details of image may be lost because the smoothing of image with the peripheral area is performed. Also, when the 3D NR level is increased, adverse effects such as image blur and blending in the successive images occur in the moving portion. In this function, the mode to set the level of effect by combining 2D/3D (normal setting) and the mode to individually set the level of effect respectively (independent setting) are available.

- In the normal setting, 6 noise reduction levels (level 1 to 5 including the Off status) are available. In this setting, 2D NR and 3D NR cannot be adjusted separately.
- In the independent setting, 8 levels (level 1 to 7 including the Off status) are available for 2D NR and 6 levels (level 1 to 5 including the Off status) are available for 3D NR.

The NR effect progressively increases as the gain increases, and NR operates with the set value as the maximum level. In bright conditions, changing the NR level will not have an effect.

High Sensitivity mode: CAM_HighSensitivity

Gain increases from 50 dB to a maximum of 70 dB, resulting in a brighter output even in darker environments.
However, with a strong gain, the captured image will contain a lot of noise.

Flicker Reduction: CAM_FlickerReduction

This function automatically reduces flicker such as that caused by fluorescent light.
When the camera detects flicker, it automatically changes the shutter speed and reduces flicker.
The shutter speed is automatically selected according to conditions such as subject brightness and the Auto Slow Shutter setting.
See the table below for the shutter speed to be selected.

Monitoring mode	Flicker Frequency	Shutter speed
60 fps	50 Hz	Auto Slow Shutter Off: 1/100 Auto Slow Shutter On: 1/100, 1/50, 1/25, 1/12.5
30 fps	50 Hz	Auto Slow Shutter Off: 1/100, 1/50 Auto Slow Shutter On: 1/100, 1/50, 1/25, 1/12.5
50 fps	60 Hz	Auto Slow Shutter Off: 1/120, 1/60 Auto Slow Shutter On: 1/120, 1/60, 1/30, 1/15
25 fps	60 Hz	Auto Slow Shutter Off: 1/120, 1/60, 1/30 Auto Slow Shutter On: 1/120, 1/60, 1/30, 1/15

If the camera does not detect flicker, it will run normal AE operation.

Notes

- This function operates only when AE is set to Full Auto.
- Flicker Reduction does not work in AE-Shutter Priority/Iris Priority/Manual/Spot AE or Wide-D.
- After the camera detects flicker and the shutter speed is changed, Extended Normal Shutter and Minimum Shutter are inoperative.
- The Flicker Reduction may not work if the subject is bright under an environment where flicker occurs.
- If the shutter speed is 1/100 (flicker frequency 50 Hz) or 1/120 (flicker frequency 60 Hz) and the brightness exceeds the Iris variable area (F14), stop the Flicker Reduction and run a normal AE operation. The Iris value is based on the Wide end converted value. For the values corresponding to the zoom position, see page 57.

Flicker Detection: CAM_FlickerDetectionInq

Flicker detection can be performed.

Notes

- Flicker detection cannot be performed for a few seconds (approximately 6 seconds at 60/59.94/50 fps, approximately 7 seconds at 30/29.97 fps, approximately 8 seconds at 25 fps) after turning the power-on.
- If a frequency including a folding frequency is detected, correct detection may not be possible.

Variable Gamma Mode: CAM_Gamma

You can set the default gamma and straight gamma.

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Gamma Offset: CAM_GammaOffset

Offset setting is possible in each variable gamma mode. The larger the value is, the brighter the entire screen becomes, and the smaller the value is, the darker the entire screen becomes.

Contrast Adjustment Function: CAM_ContrastAdjLevel

You can adjust the contrast level in 256 steps.
The smaller the value is, the lower the contrast becomes, and the larger the value is, the higher the contrast becomes.

Note

This function is available when the variable gamma mode is set to default gamma.

Temperature Reading Function: CAM_TempInq

The value of the temperature sensor built into to the camera can be read. The readout value has an error of maximum ±3 °C. As the temperature sensor is inside the camera, the readout value is not the ambient temperature. Use it as a reference value.

Image Stabilizer: CAM_Stabilizer

You can obtain steadier images by reducing screen blur caused by vibration and similar factors. This unit employs an electronic image blur correction method. As a result, the angle of view and resolution may change, but sensitivity is maintained.
There are 2 levels of image blur correction, Super and Super+. When the level is set to Super+, it suppresses stronger vibrations than in Super mode, but the angle of view becomes narrower with a lower resolution.

Hold Function of Image Stabilizer

If you suddenly stop high-speed camera movement (pan, tilt, etc.), the blur sensor may react and cause image movement. In such a case, switch the setting from On to Hold before panning or tilting, and then switch it back from Hold to On after panning or tilting. The blur correction reaction when the camera stops moving can be suppressed without changing the angle of view.

Notes

- The image stabilizer function may not work correctly under conditions where high-frequency vibration occurs. In such a case, set the image stabilizer function to Off.
- If the optical axis gap compensation function is set to On, the image stabilizer function cannot be used.

Optical Axis Gap Compensation Function: CAM_RegisterValue (47h)

This function reduces the shift of the center during optical zoom.

Notes

- There are cases in which the optical axis gap cannot be cleared completely.
- When this function is set to On, the angle of view becomes narrow.
- The image stabilizer function cannot be used at the same time.
- Restart the camera when this function is set to On/Off.

Auto Slow Shutter: CAM_AutoSlowShutter

This function automatically controls slow shutter speed when the subject brightness decreases. This function is available only when AE is set to Full Auto or Iris Priority.
For the Slow Shutter setting, see "Auto Slow Shutter Limit" (page 61) in "Register Setting".

Note

When the frame rate is 60p, 59.94p and 50p, the AE convergence time in the slow shutter mode becomes twice as long as when the frame rate is 30p, 29.97p and 25p.

Low-Illumination Chroma Suppress Mode: CAM_ChromaSuppress

You can configure a chroma suppress mode for low-illumination conditions. This can be useful when color noise is particularly noticeable in such conditions.

Focus IR Compensation: CAM_IRCorrection

When using the ICR mode, the focus performance becomes low due to lens aberration by the infrared light. This function compensates this lens aberration. Enable this function when using infrared light.

Custom Color Gain: CAM_ColorGain

You can configure the color gain.
The higher the setting value, the higher the color saturation. The lower the setting value, the lower the color saturation.

Custom Color Phase: CAM_ColorHue

You can configure the color phase.
The higher the setting value, the hue shifts to the + side. The lower the setting value, the hue shifts to the − side.

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ICR (IR Cut-Removable) Mode: CAM_ICR

The IR cut filter mounted in front of the imager can be mechanically attached or removed. When the IR Cut Filter is removed, the infrared sensitivity is increased and images can be captured in lower light conditions. When the ICR mode is set to On, the image becomes black and white. When the ICR mode is set to On (Color), the image becomes colored.

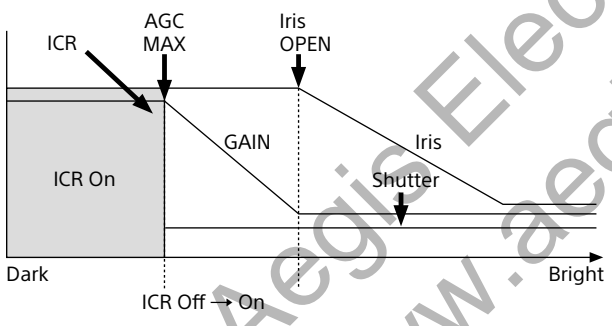
Note

When the ICR mode is in On (Color), the colors of the subject may not be reproduced accurately under certain light sources including infrared.

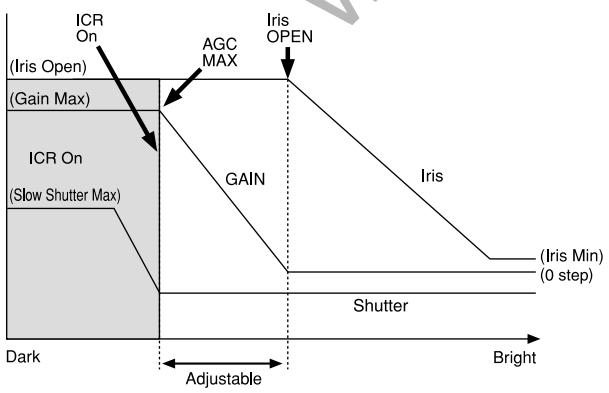
Auto ICR Mode: CAM_AutoICR

Auto ICR Mode automatically disables and enables 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).
The behavior varies depending on whether the Auto Slow Shutter is set to On.
Auto ICR Mode operates when AE is set to Full Auto. When the Auto ICR On (Color) is set, the color is added.

When Auto Slow Shutter is Off (initial setting)



When Auto Slow Shutter is On



Notes

- As the information other than brightness also enters the On/Off setting condition, a malfunction may occur when a bluish subject is displayed on the entire screen.
- When the Auto ICR Mode is in On (Color), the colors of the subject may not be reproduced accurately under certain light sources including infrared.

Camera ID: CAM_IDWrite

The ID can be set up to 65,536 (0000h to FFFFh). The camera ID will be memorized in the nonvolatile memory inside, so it will be retained even when the camera is turned off.

Note

Rewriting of memory is not unlimited. Avoid rewriting the contents frequently, such as rewriting for every operation.

Picture Effect: CAM_PictureEffect

The following function is available.

- **Monochrome:** Monochrome image

E-FLIP: CAM_PictureFlip

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

LR Reverse: CAM_LR_Reverse

This function reverses the video output from the camera horizontally.

Freeze: CAM_Freeze

With this function, an image is captured in the field memory of the camera so that this image can be output continuously.

Note

Because communication inside the camera is based on the V cycle, the captured image is always one 3V to 4Vs after sending a Command. Therefore, you cannot specify the following items for the reflection timing.

- EVEN field/ODD field during interlace outputting
- Duration from when a Command was sent until freezing

Memory (Position preset): CAM_Memory

Using the position preset function, 256 sets of camera shooting conditions can be saved and recalled.

- **Set**
  Saves the current conditions to the specified number.
- **Recall**
  Recalls the settings for the specified number and applies the settings to the camera.

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- **Reset**
  Resets the settings for the specified number.
- **Delete**
  Resets the settings for all the numbers.

For setting items, see the "Initial settings and backup of camera" (page 27).

Custom Preset: CAM_Custom

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

- **Set**
  Saves the current conditions.
- **Recall**
  Recalls the settings saved to the custom preset and applies the settings to the camera.
- **Reset**
  Resets the settings saved to the custom preset.

For setting items, see the "Initial settings and backup of camera" (page 27).

User Memory Area: CAM_MemSave

This is the memory area with 16-byte capacity which users can overwrite freely.
This can be used as a Serial No. for individual recognition.

Note

Rewriting of memory is not unlimited. Avoid rewriting the contents frequently, such as rewriting for every operation.

Register Setting: CAM_RegisterValue

Items that can be set in the register are memorized in the nonvolatile memory inside, so the data is retained.
Register Setting Command:
8x 01 04 24 mm 0p 0p FF
mm: Register No. (= 00 to 7F)
pp: Register Value (= 00 to FF)
Register Inquiry Command:
8x 09 04 24 mm FF
mm: Register No.
y0 50 0p 0p FF
pp: Register Value
(returned from the camera.)
The register setting items and No. are as follows.
See the setting value reflection timing in "Register Setting" (page 61) for the timing at which changes to each register setting take effect.

Baud Rate: 00h
The communication speed can be set.
Monitoring Mode: 72h
The output mode (image size, frame rate) can be set.
Digital Output: 60h
The TMDS output mode (color space) can be set.
Zoom Limit: 50h (Wide end), 51h (Tele end)
The Wide and Tele zoom limits can be set.
D-Zoom Max: 52h
The maximum digital zoom limit can be set.
Focus Tracking: 54h
When you want to prioritize zoom speed, set Focus Tracking to Off to minimize the transition time between Wide and Tele ends (however, since focus is not tracked during the operation, it becomes difficult to keep the subject in focus while zooming).
Focus Offset: 55h
Placing a dome cover in front of the camera may cause the focal distance of the camera to change. Especially at the Tele end, this effect may exceed the AF range and result in a failure to achieve focus. In this case, the AF range can be expanded by changing this value, but the closer to the Tele end, the longer the minimum focus distance.

Set value	00h	40h	80h	C0h	FFh
Minimum focus distance	1.2 m	1.5 m	1.7 m	2 m	3 m

For details, see "Register Setting" (page 61).
AE parameter change during VE On, Defog On: 58h
Even if VE or Defog is set to On, parameters related to AE can be changed. If you set this setting to Off, VE or Defog is available only when AE is set to Full Auto.
Auto slow shutter limit: 59h
The auto slow shutter limit can be set.
For details, see "Register Setting" (page 61).
Extended normal shutter: 5Ah
The lower limit of slow shutter when the Auto Slow Shutter mode is set to Off can be set.
Defog Limit: 5Bh, 5Ch, 5Dh
The maximum value of Defog mode in the low, mid and high levels can be set respectively.

Note

Defog Limit comes into effect in every multiple of 3 for VE and every multiple of 6 for Wide-D.

Extended mode: 5Fh
On/Off can be set.
For details, see "Extended Mode" (page 61).
Spot Light Avoidance: 20h
On/Off can be set.
Optical axis gap compensation: 47h
On/Off can be set.
For details, see "Optical Axis Gap Compensation Function: CAM_RegisterValue (47h)" (page 15).
Maximum Shutter Limit: 4Bh
You can limit the maximum shutter speed when AE is set to Full Auto or Iris Priority.

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Far Limit: 65h

You can limit the range of the focus movement on the Far end.

For details, see "Focus Limiter" (page 9).

Far Limit Position: 66h

You can set the position for the Far end limit.

For details, see "Focus Limiter" (page 9).

EIS Roll Setting: 6Eh

The height, width and rotation direction of the image can be compensated by Image Stabilizer. You can set whether to compensate the rotation direction of the Image Stabilizer function with this setting.

Factory Reset: CAM_FactoryReset

Settings will return to the factory preset value. Custom Preset, Memory (Position preset) and Register Setting are also initialized.

Note

No command is acceptable during resetting. The camera restarts automatically after the reset is completed.

Title Display: CAM_MultiLineTitle

- You can set a title of up to 11 lines. One line can contain up to 20 characters.
- You can set the display On/Off status, the horizontal position of the first character, the color and the blinking state for each line.
- The camera gives priority to a title display when the camera status is displayed on the relevant line. On the lines where a title is not set, the camera status is displayed.

Line Number	0h to Ah	
H-position	00h to 1Fh	
Color	00h	WHITE
	01h	YELLOW
	02h	VIOLET
	03h	RED
	04h	CYAN
	05h	GREEN
	06h	BLUE
Blink	00h	Off
	01h	On

00	01	02	03	04	05	06	07
A	B	C	D	E	F	G	H
08	09	0A	0B	0C	0D	0E	0F
I	J	K	L	M	N	O	P
10	11	12	13	14	15	16	17
Q	R	S	T	U	V	W	X
18	19	1A	1B	1C	1D	1E	1F
Y	Z	&		?	!	1	2
20	21	22	23	24	25	26	27
3	4	5	6	7	8	9	0

28	29	2A	2B	2C	2D	2E	2F
À	È	Ì	Ò	Ù	Á	É	Í
30	31	32	33	34	35	36	37
Ó	Ú	Â	Ê	Ô	Æ		Ã
38	39	3A	3B	3C	3D	3E	3F
Õ	Ñ	Ç	ß	Ä	Ï	Ö	Ü
40	41	42	43	44	45	46	47
Å	$		¥		£	¿	¡
48	49	4A	4B	4C	4D	4E	4F
ø	”	:	’	.	,	/	-

Privacy Zone Masking (PZM) Function: CAM_PrivacyZone

This function protects private objects and areas such as house windows, entrances and exits.
Masks the privacy zone (windows, entrances, exits, etc.) within the camera view on the monitor to protect privacy.

Features

- Mask can be set on up to 24 places according to Pan/Tilt positions.
- Mask can be displayed on 8 places per screen simultaneously.
- Individual On/Off zone masking settings.
- Two colors can be individually set for each of 24 privacy zones.
- Interlocking control with zooming.
- Interlocking control with Pan/Tilt.
- Non-interlocking control with Pan/Tilt.

Details of Setting Commands

- **Set Mask**

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

mm	Sets Mask. See "mm: Mask setting list" (page 20) in "Parameters".
nn	Selects whether to set a new Mask or reset the existing Mask. See "nn: Setting" (page 20) in "Parameters".
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" (page 20) in "Parameters".

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.
- In consideration of aging and optical axis gap, it is recommended that you set the size to at least twice the size of the object (height and width) and check it regularly.

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- The angle of view changes by switching On/Off for “Optical axis gap compensation”, but the mask position and size do not change. Therefore, it is recommended that you reconfirm the mask position and size.

- **Set Display**

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

pp pp pp pp	Each of the 24 Privacy Zones corresponds to the BIT. See “pp pp pp pp: Mask bit” (page 20) in “Parameters”.

  Comments: Each of 24 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 of the 24 Privacy Zones corresponds to the BIT. See “pp pp pp pp: Mask bit” (page 20) in “Parameters”.
qq	Set the color code.
rr	Set the color code. See “qq, rr: Color code” (page 20) in “Parameters”.

  Comments: Two different color masks can be chosen. Two colors can be individually set for each of 24 privacy zones.
  If the bit of the parameter (pp pp pp pp) is set to “0”, the mask color will be the color code “qq”. If the bit of the parameter (pp pp pp pp) is set to “1”, the mask color will be the color code “rr”.
  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 Pan Tilt 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” (page 20) in “Parameters”.

  Comments: 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.

- **Set PTZ Mask**

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

mm	Sets Mask. See “mm: Mask setting list” (page 20) in “Parameters”.
ppp	Pan Angle (000 to FFF) See “Setting pan/tilt angle” (page 20) in “Parameters”.
qqq	Tilt Angle (000 to FFF) See “Setting pan/tilt angle” (page 20) in “Parameters”.
rrrr	Zoom Position (0000 to 4000) See “Zoom Ratio and Zoom Position (for reference)” (page 59).

  Comments: The mask can be set at a desired position by setting the pan, tilt angles and zoom position using this command.

Note

The privacy mask zone follows the change of view angle by zooming. However, the follow might be delayed for a moment if there is any big change, such as when using D-Zoom or E-FLIP.

- **Non Interlock Mask**

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

mm	Sets Mask. See “mm: Mask setting list” (page 20) in “Parameters”.
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. See “pp: x, qq: y, rr: w, ss: h” (page 20) in “Parameters”.

  Commands: Mask does not interlock with pan/tilt. The limitations of parameters are as follows.
  x: ±50h w: ±50h
  y: ±2Dh 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.

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Parameters

• mm: Mask setting list

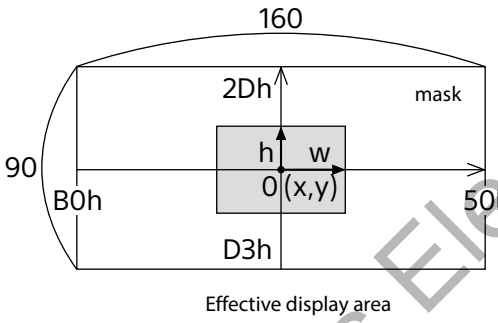
Mask Name	mm (Hex)
Mask_A	00h
Mask_B	01h
Mask_C	02h
Mask_D	03h
Mask_E	04h
Mask_F	05h
Mask_G	06h
Mask_H	07h
Mask_I	08h
Mask_J	09h
Mask_K	0Ah
Mask_L	0Bh

Mask Name	mm (Hex)
Mask_M	0Ch
Mask_N	0Dh
Mask_O	0Eh
Mask_P	0Fh
Mask_Q	10h
Mask_R	11h
Mask_S	12h
Mask_T	13h
Mask_U	14h
Mask_V	15h
Mask_W	16h
Mask_X	17h

• nn: Setting

nn	Setting
00h	Resets the zone size (the value of w, h) for the existing mask.
01h	Newly sets the zone size (the value of w, h).

• pp: x, qq: y, rr: w, ss: h



Note

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 pp pp pp: Mask bit

	pp								pp							
bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Mask	-	-	X	W	V	U	T	S	-	-	R	Q	P	O	N	M

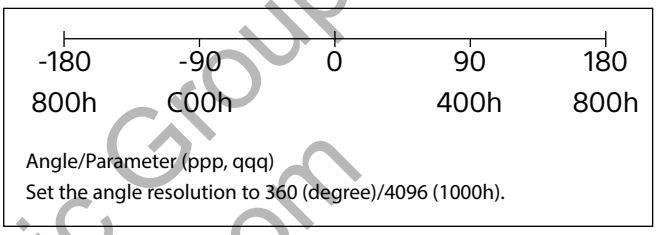
	pp								pp							
bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Mask	-	-	L	K	J	I	H	G	-	-	F	E	D	C	B	A

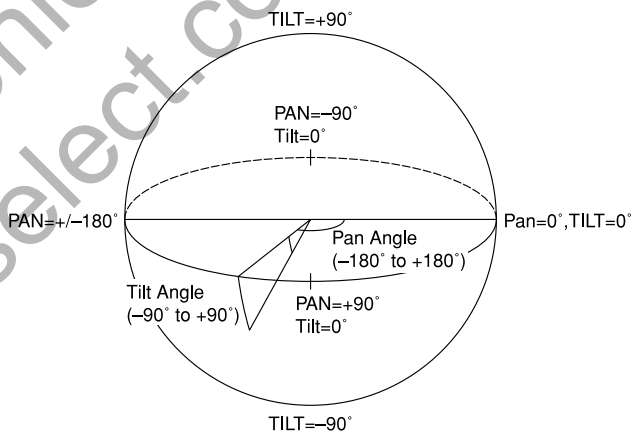
The "-" must be "0".

• qq, rr: Color code

Mask (color)	Code (qq, rr)
Black	00 h
Gray1	01 h
Gray2	02 h
Gray3	03 h
Gray4	04 h
Gray5	05 h
Gray6	06 h
White	07 h
Red	08 h
Green	09 h
Blue	0A h
Cyan	0B h
Yellow	0C h
Magenta	0D h

• Setting pan/tilt angle





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Motion Detection (MD) Function: CAM_MD

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 Command.

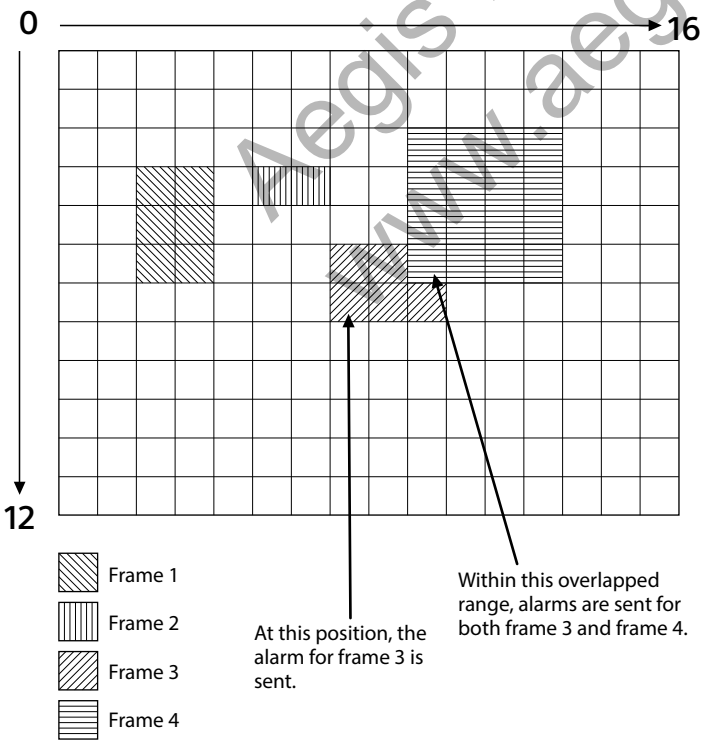
Features

- You can set a frame for the detection range of 16 (horizontally) × 12 (vertically) blocks.
- You can set up to four frames.
- When the motion is detected in the set frame, the Alarm Reply VISCA Command is sent.
- The threshold level for detection can be set. When the threshold level becomes high, an alarm signal is not sent if the movement is small. When the threshold level becomes low, an alarm signal is sent even if the movement is small. (Common to four frames)
- The interval of alarm detection can be set up to 255 seconds in units of one second.
- You can select On/Off for each frame.
- The frame number is also sent with Alarm Reply 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.



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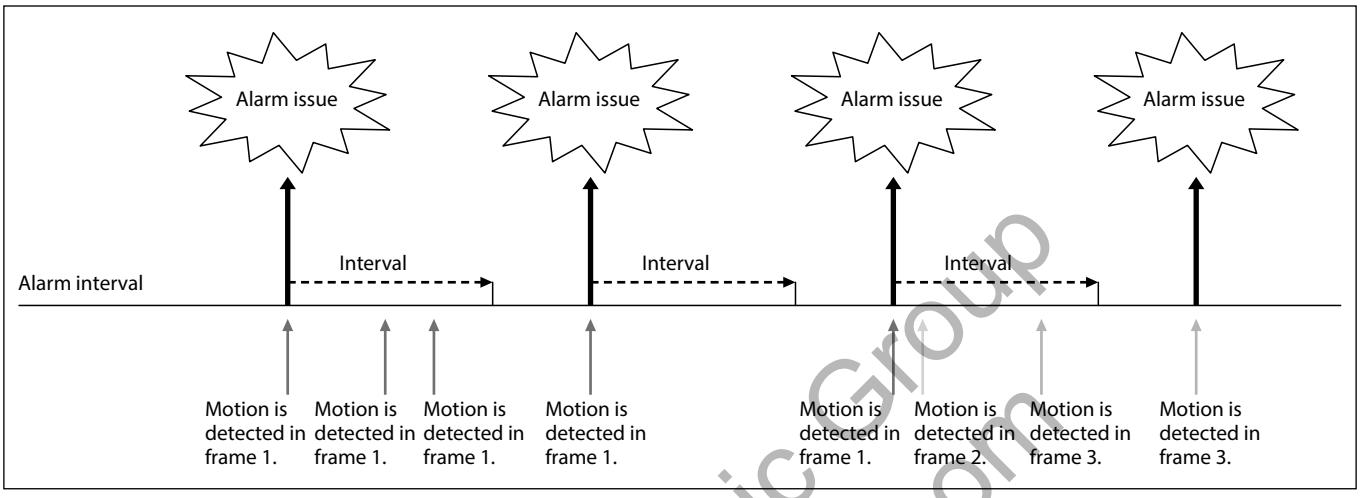
Sending Alarms

- When motion is detected, the Alarm Reply command is issued via the VISCA command.
- 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.



Details of Setting Commands

- **MD On/Off**

  By sending an MD On command, the frame is displayed when motion is detected in the set detection frame. The Alarm Reply command is issued via the VISCA communication.

8x 01 04 1B 02 FF --- On
8x 01 04 1B 03 FF --- Off

- **Function Set**

  Select the detection 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)
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.)

- **Window Set**

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

Notes

- Set a terminating point higher vertically and horizontally than the starting point. If you set the wrong value, an error occurs.
- It is recommended to set the frame setting a little larger to account for lens distortion.

8x 01 04 1D 0m pp qq rr ss FF
m: Select Detection Frame (0: Frame0, 1: Frame1, 2: Frame2, 3: Frame3) - (0, 1, 2, 3)
pp: Start Horizontal Position - (00 to 0F)
qq: Start Vertical Position - (00 to 0B)
rr: Stop Horizontal Position - (01 to 10)
ss: Stop Vertical Position - (01 to 0C)

- **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)

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Extended Commands

Extended commands support the following functions (described previously).
Turn on this mode (for details, see “Extended Mode” (page 61) in “Register Setting”) to enable the following functions.

- **Exposure Compensation: CAM_ExExpComp**
  The setting can be set in steps of approximately 0.2 dB (–128 (00h) to +127 (FFh)).
  For details, see page 12.
- **Aperture Control: CAM_ExAperture**
  The setting can be set to 256 steps (00h to FFh).
  For details, see page 12.
- **Custom Color Gain: CAM_ExColorGain**
  You can configure the color gain.
  The setting can be set to 256 steps (00h to FFh).
  The higher the setting value, the higher the color saturation. The lower the setting value, the lower the color saturation.
  You can set the color saturation more widely and finely than the normal color gain variable.
  For details, see page 15.
- **Custom Color Phase: CAM_ExColorHue**
  You can configure the color phase.
  The setting can be set to 256 steps (00h to FFh).
  The higher the setting value, the hue shifts to the + side. The lower the setting value, the hue shifts to the – side.
  You can set the hue more finely than the normal color phase variable.
  For details, see page 15.
- **Auto ICR Mode: CAM_ExAutoICR**
  The setting of ICR On → Off threshold can be set when Auto ICR is On.
  The setting can be set to 256 steps (00h to FFh).
  The setting of ICR Off → On threshold (On Level) can be set when Auto ICR is On.
  The setting can be set to 29 steps (00h to 1Ch).
  For details, see page 16.

Note

When extended mode is Off, Command Not Executable will be returned if you send extended commands to the camera.
When extended mode is On, Command Not Executable will be returned if you send normal commands to the camera.

Firmware Update

Overview

This section describes the firmware update procedure.
To perform the firmware update, the following three steps are required.

1) Shifting to the maintenance mode using the VISCA command
2) Binary transmission (X modem protocol) of the firmware in the maintenance mode
3) Finalizing setting using the VISCA command

Each step is described as follows.

1) Shifting to the maintenance mode using the VISCA command
After entering the standby mode using the VISCA command, the unit shifts to the maintenance mode.
Note that if the power is turned off during the writing, the program will be broken and cannot be restored.

2) Binary transmission (X modem protocol) of the firmware in the maintenance mode

Serial Port Setting during maintenance mode

Communication Speed	115200 bps
Data bit	8 bit
Parity	None
Stop bit	1 bit
Flow control	None

In the maintenance mode, the terminal software capable of sending the character command is used.
The terminal software that is provided with the XMODEM binary transfer protocol is used.
When you transfer the camera firmware (uug.bin file) using this function, the transferred file is written in FlashROM. The writing takes approximately 10 minutes.
Note that if the power is turned off during writing, the program may be broken and may not be restorable.
After the writing is completed, the unit restarts automatically, and then the camera firmware is started.

3) Finalizing setting using the VISCA command
The finalizing setting is performed using the VISCA command.
You cannot read the correct camera firmware version without performing this setting. Be sure to perform this setting.

Note

When upgrading the firmware version, Custom Preset, Memory (Position preset) and Register Setting take over the settings before upgrading. When downgrading the version, all settings are initialized.

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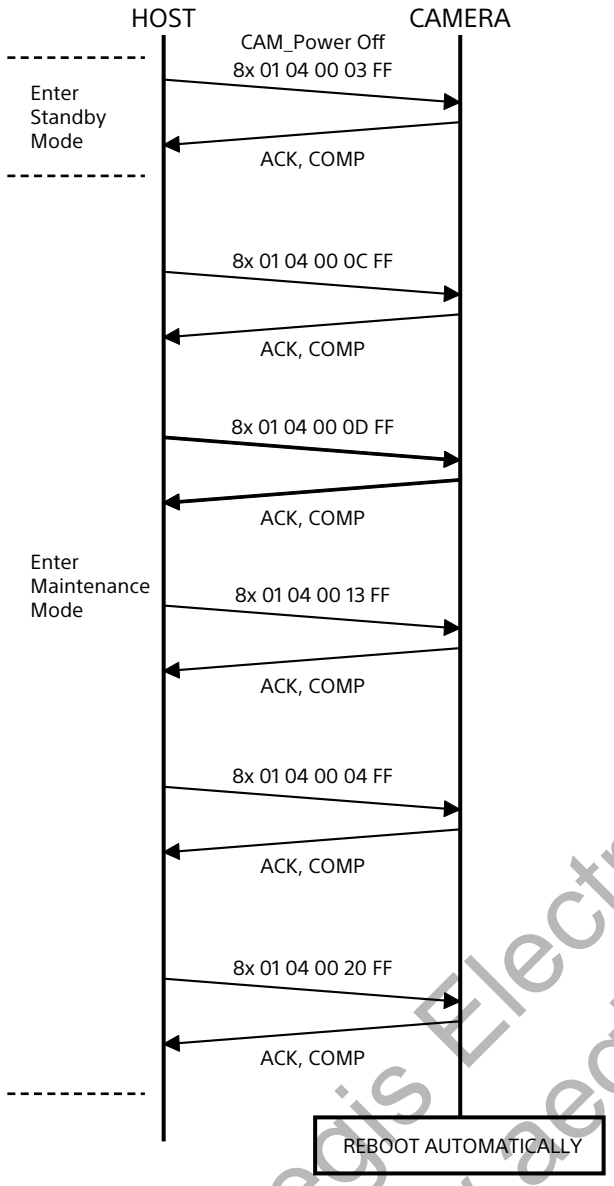
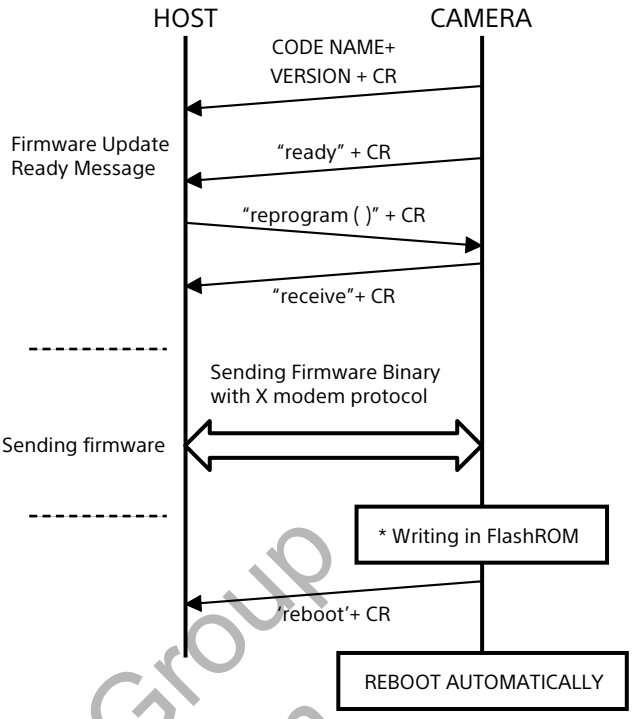
Update Procedure

Enter Maintenance Mode



* Do not turn Off the power while updating because there is a possibility that the camera will break.

Maintenance Mode



* Do not turn Off the power while updating because there is a possibility that the camera will break.

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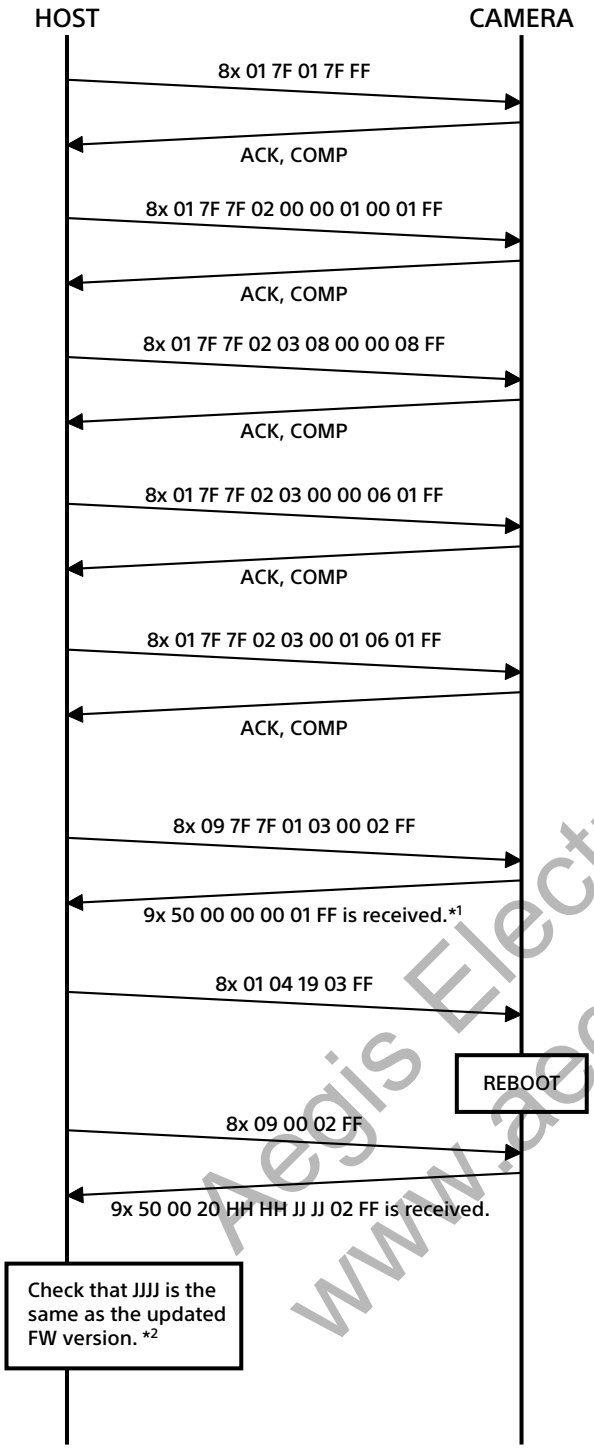
Finalizing procedure

After the maintenance mode, perform the following finalizing procedure.



*1 When 9x 50 00 00 00 00 FF is received, retransmit 8x 09 7F 7F 01 03 00 02 FF until 9x 50 00 00 00 01 FF is received.

*2 If it is not the same, perform the update procedure from the beginning.

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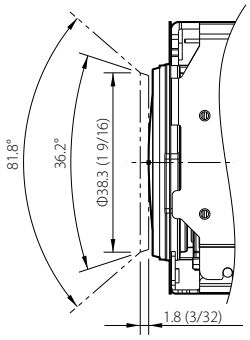
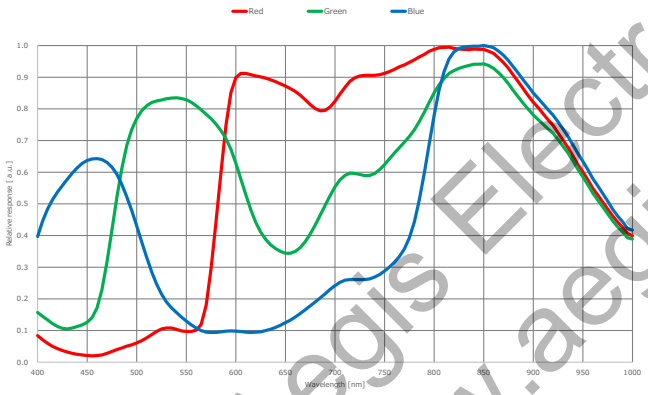
Eclipse

When designing the housing, refer to the dimensional allowance as shown in the figure below.



unit: mm (inches)

Example of Spectral Sensitivity Characteristics



Use the graph as a reference value. (We can not guarantee these values.)
This data is measured when the IR cut filter is removed and the characteristics of the lens and optical source characteristics are ignored.

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Initial settings and backup of camera

“Initial settings” are the factory preset values.
“Custom Preset”: ○ indicates data that can be saved and × indicates data that cannot be saved using the custom preset function.
“Memory (Position preset)”: ○ indicates data that can be saved and × indicates data that cannot be saved using the memory function.
“Back up on standby”: indicates that ○ is retained while on Standby and × is not retained.

Mode/Position setting	Initial Settings	Custom Preset	Memory (Position preset)	Back up on standby
Zoom Position	Wide end	○	○	○
D-Zoom On/Off	On	○	○	○
D-Zoom Separate/Combine	Combine	○	○	○
D-Zoom Position	00h	○	○	○
Focus Position	—	○	○	○
Focus Auto/Manual	Auto	○	○	○
Near Limit Setting	9000h	○	○	○
AF Sensitivity	Normal	○	○	○
AF Mode	Normal	○	○	○
AF Movement Time	5 sec	○	○	○
AF Interval	5 sec	○	○	○
Spot Focus On/Off	Off	○	○	○
Spot Focus Set Parameter	Starting point (3,2), terminating point (5,4)	○	○	○
Spot Focus Display	Off	○	○	○
Focus IR compensation	0: standard	×	×	○
WB Mode	Auto	○	○	○
WB Data (R Gain, B Gain)	—	○	○	○
WB Speed	3h	○	○	○
WB Offset	7h	○	○	○
Spot AWB On/Off	Off	○	○	○
Spot AWB Set Parameter	Starting point (3,2), terminating point (5,4)	○	○	○
Spot AWB Display	Off	○	○	○
One Push WB Data	—	○	○	○
AE Mode	Full Auto	○	○	○
AE Response	01h	○	○	○
Auto Slow Shutter Mode	Off	○	○	○
Shutter Position	—	○	○	○
Iris Position	—	○	○	○
Gain Position	—	○	○	○
Exposure Compensation On/Off	Off	○	○	○
Exposure Compensation Amount	±0	○	○	○
BackLight On/Off	Off	○	○	○
Spot AE On/Off	Off	○	○	○
Spot AE Set Parameter	Starting point (3,2), terminating point (5,4)	○	○	○
Spot AE Display	Off	○	○	○
Aperture Gain	07h	○	○	○
Aperture Mode	Auto	○	○	○
Bandwidth	0h	○	○	○
Crispening	3h	○	○	○
B/W Balance	2h	○	○	○
Limit	3h	○	○	○
High Light Detail	0h	○	○	○

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Mode/Position setting	Initial Settings	Custom Preset	Memory (Position preset)	Back up on standby
LR Reverse On/Off	Off	○	○	○
Freeze On/Off	Off	×	×	×
Picture Effect	Off	○	○	○
ICR On/Off/On (Color)	Off	○	○	○
Auto ICR On/Off/On (Color)	Off	○	○	○
Auto ICR Threshold Level	0Eh	○	○	○
Camera Memory	Same as the initial value setting	×	×	○
Display On/Off	Off	○	×	○
Mute On/Off	Off	×	×	×
Auto ICR Alarm On/Off	Off	○	○	○
Image Stabilizer On/Off/Hold	Off	○	○	○
Image Stabilizer Level	Super	○	○	○
High Sensitivity mode On/Off	Off	○	○	○
Gamma	0: Default	○	○	○
Gamma Offset	Offset amount: 0	○	○	○
Defog On/Off	Off	○	○	○
NR level (normal setting)	3	○	○	○
NR level (independent setting)	Disabled	○	○	○
Gain Limit	—	○	○	○
Low-Illumination Chroma Suppress	01h (Low)	○	○	○
Color Gain	4h (100%)	○	○	○
Color Hue	7h (0 degrees)	○	○	○
Title Display On/Off	Off	○	×	○
Title Setting	—	○	×	○
PZM Setting	—	○	×	○
PZM On/Off	Off	○	×	○
PZM Display On/Off	Off	○	×	○
PZM Color Setting	—	○	×	○
Center Line Display On/Off	Off	○	×	○
E-Flip On/Off	Off	○	×	○
Camera ID	0000h	×	×	○
MD On/Off	Off	○	×	○
MD Display Setting	Off	○	×	○
MD Threshold Level	10h	○	×	○
MD Interval	1 sec	○	×	○
MD Window Setting	—	○	×	○
ZoomPos Continuous Output On/Off	Off	×	×	○
ZoomPos Continuous Output Interval	3Ch	×	×	○
FocusPos Continuous Output On/Off	Off	×	×	○
FocusPos Continuous Output Interval	3Ch	×	×	○
Minimum Shutter Mode	Off	○	○	○
Minimum Shutter Limit	1/125	○	○	○
HLC Level	Off	○	○	○
HLC Mask Level	Off	○	○	○
VE On/Off	Off	○	○	○
VE Parameter	Display brightness level: 3 Brightness compensation: 2 (Standard) Compensation level: 1 (Mid)	○	○	○
Wide-D On/Off	Off	○	○	○

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Mode/Position setting	Initial Settings	Custom Preset	Memory (Position preset)	Back up on standby
Wide-D Parameter	Display brightness level: 3 Brightness compensation: 2 (Standard) Compensation level: 1 (Mid)	○	○	○
Contrast Adjustment	80h	○	○	○
Flicker Reduction	Off	○	○	○
Extended Exposure Compensation Amount	80h	○	○	○
Extended Aperture Gain	C1h	○	○	○
Extended Auto ICR Threshold Level	0Eh	○	○	○
Extended Auto ICR On Level	16h	○	○	○
Extended Color Gain	80h	○	○	○
Extended Color Hue	80h	○	○	○

Notes

- Acceptable number to write custom presets and Memory (Position preset) is limited.
- Privacy Zone Setting while digital zooming is not preserved by Custom Preset.

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Mode Condition

Condition

Mode	Standby	Initializing	Power On	Freeze On	MemRecall
Address Set	○	○	○	○	○
IF_Clear	○	○	○	○	○
Command Cancel	○	○	○	○	○
Power On/Off	○	○	○	○	○

Lens

Mode	Standby	Initializing	Power On	Freeze On	MemRecall	Zoom Direct	Focus Direct	ZmFo Direct	Focus Auto
Zoom Tele/Wide/Stop	×	×	○	○	×	×	○	×	○
Zoom Direct	×	×	○	○	×	○	○	×	○
Zoom Focus Direct	×	×	○	○	×	×	×	○	×
D-Zoom On/Off	×	×	○	○	×	×	○	×	○
D-Zoom Separate/Combine	×	×	○	○	×	×	○	×	○
D-Zoom Tele/Wide/Stop	×	×	○	○	×	○	○	○	○
D-Zoom Direct	×	×	○	○	×	○	○	○	○
Focus Far/Near/Stop	×	×	○	○	×	○	○	×	×
Focus Direct	×	×	○	○	×	○	○	×	×
Focus Auto/Manual	×	×	○	○	×	○	×	×	○
One Push AF	×	×	○	○	×	○	×	×	×
Spot Focus On/Off	×	×	○	○	×	○	○	○	○
Spot Focus Setting	×	×	○	○	×	○	○	○	○
Focus Near Limit	×	×	○	○	×	○	×	×	○
AF Sensitivity Normal/Low	×	×	○	○	×	○	○	○	○
AF Mode Norm/Interval/Zoom	×	×	○	○	×	○	○	○	○
AF Movement Time/Interval Setting	×	×	○	○	×	○	○	○	○
Camera Memory Set/Reset	×	×	○	○	×	×	×	×	○
Camera Memory Recall	×	×	○	○	○	×	×	×	○
Lens Initialize	×	×	○	○	×	×	×	×	○

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White Balance

Mode	Standby	Initializing	Power On	Freeze On	MemRecall	WB Auto	Indoor	Outdoor	Outdoor Auto	Sodium Lamp	Sodium Lamp Auto	Sodium Lamp Outdoor Auto	One Push WB	ATW	Manual
WB Mode Switchover	×	×	○	○	×	○	○	○	○	○	○	○	○	○	○
One Push Trigger	×	×	○	○	×	×	×	×	×	×	×	×	○	×	×
Spot AWB On/Off	×	×	○	○	×	○	○	○	○	○	○	○	○	○	○
Spot AWB Setting	×	×	○	○	×	○	○	○	○	○	○	○	○	○	○
R Gain Setting	×	×	○	○	×	×	×	×	×	×	×	×	×	×	○
B Gain Setting	×	×	○	○	×	×	×	×	×	×	×	×	×	×	○
WB Speed	×	×	○	○	×	○	○	○	○	○	○	○	○	○	○
WB Offset	×	×	○	○	×	○	○	○	○	○	○	○	○	○	○

Exposure

Mode	Standby	Initializing	Power On	Freeze On	MemRecall	AE Full Auto	AE Manual	Shutter Priority	Iris Priority	Wide-D	VE/Defog	HLC
AE Full Auto	×	×	○	○	×	○	○	○	○	○	○	○
AE Manual	×	×	○	○	×	○	○	○	○	×	○	○
Shutter Priority	×	×	○	○	×	○	○	○	○	×	○	○
Iris Priority	×	×	○	○	×	○	○	○	○	×	○	○
Shutter Setting	×	×	○	○	×	×	○	○	×	×	○	○
Iris Setting	×	×	○	○	×	×	○	×	○	×	○	○
Gain Setting	×	×	○	○	×	×	○	×	×	×	○	○
Auto Slow Shutter On/Off	×	×	○	○	×	○	○	○	○	○	○	○
Exposure Compensation On/Off	×	×	○	○	×	○	×	○	○	○	○	○
Exposure Compensation Setting	×	×	○	○	×	○	×	○	○	○	○	○
BackLight On/Off	×	×	○	○	×	○	×	×	×	×	○	×
Spot AE On/Off	×	×	○	○	×	○	○	○	○	×	○	×
Spot AE Setting	×	×	○	○	×	○	○	○	○	×	○	×
Defog On/Off	×	×	○	○	○	○	○	○	○	○	○	○
Minimum Shutter On/Off	×	×	○	○	×	○	○	×	○	×	○	○
VE On/Off	×	×	○	○	○	○	○	○	○	○	○	○
HLC Setting (On/Off/Mask Level)	×	×	○	○	○	○	○	○	○	×	○	○
Wide-D On/Off	×	×	○	○	○	○	×	×	×	○	○	○
Flicker Reduction	×	×	○	○	○	○	×	×	×	×	○	○

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Others

Mode	Standby	Initializing	Power On	Freeze On	MemRecall
Aperture Setting	×	×	○	○	×
LR_Reverse On/Off	×	×	○	○	×
Freeze On/Off	×	×	○	○	×
Picture Effect Setting	×	×	○	○	×
ICR On/Off	×	×	○	○	×
Auto ICR On/Off	×	×	○	○	×
Auto ICR Threshold Level Setting	×	×	○	○	×
Auto ICR Alarm On/Off	○	○	○	○	○
Display On/Off	×	×	○	○	○
Mute On/Off	×	×	○	○	○
Title Setting	×	×	○	○	○
Mask On/Off	×	×	○	○	○
Mask Setting	×	×	○	○	○
MD On/Off	×	×	○	○	○
MD Window Setting	×	×	○	○	○
MD Function Setting	×	×	○	○	○
ID Write	×	×	○	○	○
Memory Save	×	×	○	○	×
Register Value Setting	×	×	○	○	×
NR Level Setting	×	×	○	○	○
Chroma Suppress	×	×	○	○	○
Color Gain	×	×	○	○	○
Color Hue	×	×	○	○	○
Contrast Adjustment	×	×	○	○	○
Flicker Reduction	×	×	○	○	○

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State transitions of the exclusive control function

The state transitions of the exclusive control function differs depending on the Monitoring Mode.

When the Monitoring Mode is 2160p/30, 2160p/29.97, 2160p/25, 1080p/60, 1080p/59.94, 1080p/50, 1080p/30, 1080p/29.97, 1080p/25, 1080i/60, 1080i/59.94, 1080i/50, 720p/60, 720p/59.94, 720p/50, 720p/30, 720p/29.97, 720p/25, 480p/59.94, 576p/50

Status no.	Status			Events (changes by command) and transitions					
	Wide-D	OSD	3D NR	Wide-D On	Wide-D Off	OSD On	OSD Off	3D NR On	3D NR Off
1	Off	Off	Off	to 5	-	to 3	-	to 2	-
2	Off	Off	On	to 6	-	to 4	-	-	to 1
3	Off	On	Off	to 7	-	-	to 1	to 4	-
4	Off	On	On	to 7	-	-	to 2	-	to 3
5	On	Off	Off	-	to 1	to 7	-	to 6	-
6	On	Off	On	-	to 2	to 7	-	-	to 5
7	On	On	Off	-	to 3	-	to 5	to 6	-
8	On	On	On	-					

When the Monitoring Mode is 2160p/60, 2160p/59.94, 2160p/50

Status no.	Status			Events (changes by command) and transitions					
	Wide-D	OSD	3D NR	Wide-D On	Wide-D Off	OSD On	OSD Off	3D NR On	3D NR Off
1	Off	Off	Off	to 5	-	to 3	-	to 2	-
2	Off	Off	On	to 6	-	to 3	-	-	to 1
3	Off	On	Off	to 7	-	-	to 1	to 2	-
4	Off	On	On	-					
5	On	Off	Off	-	to 1	to 7	-	to 6	-
6	On	Off	On	-	to 2	to 7	-	-	to 5
7	On	On	Off	-	to 3	-	to 5	to 6	-
8	On	On	On	-					

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Command List

VISCA/RS-232C Commands

This Manual outlines an RS-232C control protocol and command list for certain Sony cameras from which control software can be developed.
THIS CONTROL PROTOCOL AND COMMAND LIST IS PROVIDED BY SONY ON AN "AS-IS BASIS" WITHOUT WARRANTY OF ANY KIND. SONY DOES NOT WARRANT ANY PARTICULAR RESULT FROM THE USE OF THIS CONTROL PROTOCOL AND COMMAND LIST AND DISCLAIMS AND EXCLUDES ALL WARRANTIES. EXPRESS OR IMPLIED, WITH RESPECT TO THAT CONTROL PROTOCOL AND COMMAND LIST, INCLUDING, BUT NOT LIMITED TO, ANY OR ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN FACT, SONY SPECIFICALLY ACKNOWLEDGES THAT SOFTWARE DEVELOPED BASED ON THIS CONTROL PROTOCOL AND COMMAND LIST MAY CAUSE MALFUNCTION OR DAMAGE TO HARDWARE AND SOFTWARE USED WITH IT (INCLUDING SONY HARDWARE AND SOFTWARE) AND SPECIFICALLY DISCLAIMS ANY LIABILITY FOR ANY SUCH MALFUNCTION OR DAMAGE. THIS CONTROL PROTOCOL AND COMMAND LIST SHOULD BE USED WITH CAUTION.

Overview of VISCA

In VISCA, the device outputting commands, for example, a computer, is called the controller. The device receiving the commands, a camera is called the peripheral device. The camera itself functions as a 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.

- Communication speed: 9.6 kbps/19.2 kbps/ 38.4 kbps/115.2 kbps
- Data bits: 8
- Start bit: 1
- Stop bit: 1
- Non parity

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

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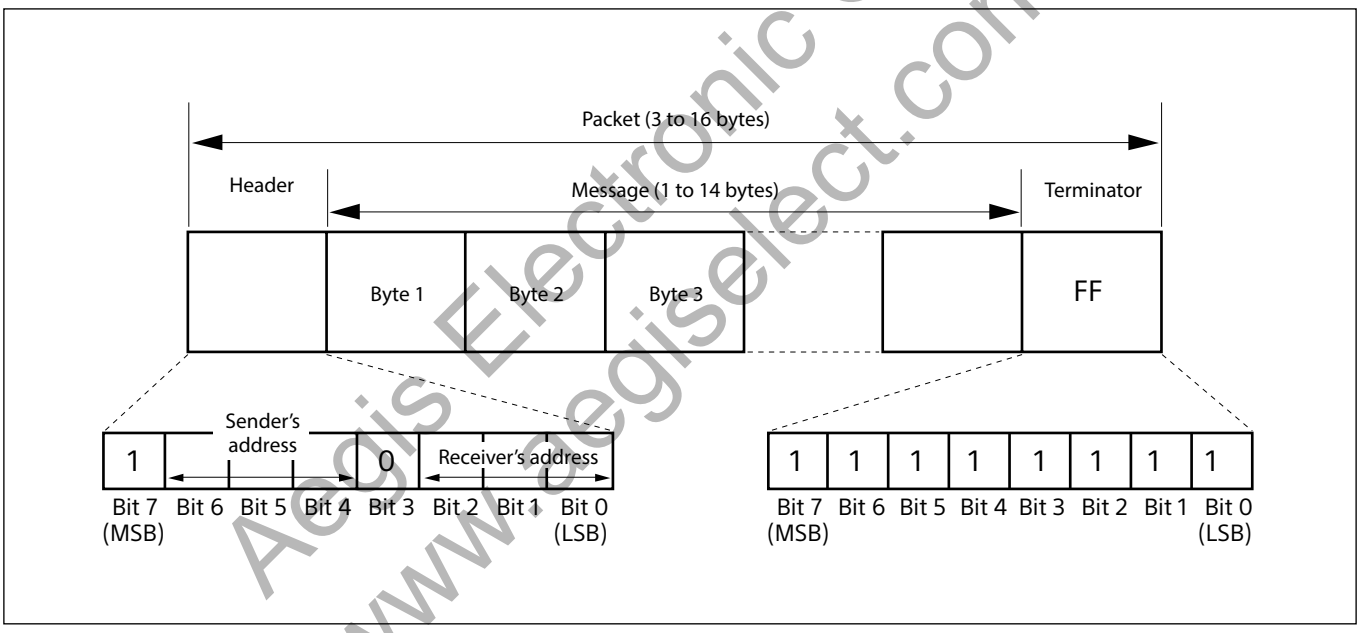
VISCA Communication Specifications

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.



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Command and inquiry

- **Command**
  Sends operation commands to the camera.
- **Inquiry**
  Used for inquiring about the current state of the camera.

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Responses for commands and inquiries

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

	Reply Packet	Note
Acknowledge	X0 4Y FF	Y = socket number
Completion (Commands)	X0 5Y FF	Y = socket number
Completion (Inquiries)	X0 5Y ... FF	Y = socket number

X = 9 to F: FCB camera address + 8

- **Error message**
  When a command could not be executed or failed, an error message is returned instead of the Acknowledge message. After an Acknowledge message, an error message may be returned if the process of some command (zoom, etc.) has not been completed. When an inquiry command could not be executed or failed, an error message is returned instead of the completion message.

Error Packet	Description
X0 60 01 FF	Message length error (>14 bytes)
X0 60 02 FF	Syntax Error
X0 60 03 FF	Command Buffer Full
X0 6Y 04 FF	Command Cancelled
X0 6Y 05 FF	No Socket (to be cancelled)
X0 6Y 41 FF	Command Not Executable

X = 9 to F: FCB camera address + 8, Y = socket number

Socket number

When command messages are sent to the camera, 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 Acknowledge 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, all inquiry commands (including Command Cancel, Address Set and Block Inquiry Command) can be executed.

The Acknowledge message is not returned for these commands and inquiries.

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, specify a socket for the command to cancel.

	Cancel Packet	Note
Cancel	8X 2Y FF	Y = socket number

X = 1 to 7: FCB camera address, Y = socket number

An error message “Command Cancelled” will be returned for this command, but this is not a fault. It indicates that the command has been cancelled.

Note

The following commands cannot be cancelled even if the Cancel command is sent while being executed.

- CAM_Power On/Off
- CAM_RegisterValue
- CAM_Memory Reset/Set
- CAM_Custom Reset/Set
- CAM_Initialize (Camera)
- CAM_FactoryReset

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VISCA Device Setting Command

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

For VISCA network administration

- **Address Set**
  Sets an address of a peripheral device. Use when initializing the network, and receiving the following network change message.
- **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 Set	88 30 01 FF	Always broadcasted.
Network Change	X0 38 FF	

X = 9 to F: FCB camera address + 8

Note

Start sending the VISCA command after turning on the camera and receiving the Network Change.

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	8X 01 00 01 FF	Y0 50 FF	
IF_Clear (Broadcast)	88 01 00 01 FF	88 01 00 01 FF	

X = 1 to 7: FCB camera board address (For Inquiry Packet)
Y = 9 to F: FCB camera board address + 8 (For Reply Packet)

Note

The following commands cannot be cancelled even if the IF_Clear is issued while being executed.

- CAM_Power On/Off
- CAM_RegisterValue
- CAM_Memory Reset/Set
- CAM_Custom Reset/Set
- CAM_Initialize (Lens)
- CAM_Initialize (Camera)
- CAM_FactoryReset

VISCA interface and inquiry

- **CAM_VersionInq**
  Returns information on the VISCA interface.

Inquiry	Inquiry Packet	Reply Packet	Description
CAM_VersionInq	8X 09 00 02 FF	Y0 50 GG GG HH HH JJ JJ KK FF	GGGG = Vender ID (0020: Sony) HHHH = Model ID 0712: FCB-ER9100 JJJJ = ROM revision KK = Maximum socket #(02)

X = 1 to 7: FCB camera address (For Inquiry Packet)
Y = 9 to F: FCB camera address + 8 (For Reply Packet)

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VISCA Command/Acknowledge Protocol

Command	Command Message	Reply Message	Comments
General Command	81 01 04 38 02 FF (Example)	90 41 FF (Acknowledge) +90 51 FF (Completion) 90 42 FF 90 52 FF	Returns Acknowledge 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)	Acknowledge 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)	Acknowledge is not returned for this command.
Command Cancel	8x 2y FF	z0 6y 04 FF (Command Cancelled)	Returned when the command of the specified socket is cancelled. Completion for the cancelled command is not returned.
		z0 6y 05 FF (No Socket)	Returned when the command of the specified socket has already been completed or when the specified socket number is wrong.
		z0 6y 41 FF (Command Not Executable)	It is not cancelled for the below command. • CAM_Power On/Off • CAM_RegisterValue • CAM_Memory Reset/Set • CAM_Custom Reset/Set • CAM_Initialize (Camera) • CAM_FactoryReset The command of the specified socket is not cancelled and Completion for the command being executed is returned after execution.

z = FCB camera address + 8

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VISCA Camera-Issued Messages

Acknowledge/Completion Messages

	Command Message	Comments
Acknowledge	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 = FCB camera address + 8

Error Messages

	Command Message	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 Cancelled	z0 6y 04 FF (y: Socket No.)	Returned when a command which is being executed in a socket specified by the cancel command is cancelled. 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 while performing AF.

z = FCB camera address + 8

Network Change Message

	Command Message	Comments
Network Change	z0 38 FF	Issued when power is supplied to the camera.

z = FCB camera address + 8

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Camera Commands

Command List (1/7)

Command Set	Command	Command Packet	Initial	Min	Max	Comments
AddressSet	Broadcast	88 30 01 FF	1h	1h	7h	Address Setting
IF_Clear	—	8x 01 00 01 FF	—	—	—	I/F Clear
	Broadcast	88 01 00 01 FF	—	—	—	
CommandCancel	—	8x 2p FF	—	1h	2h	p: Socket No. (= 1 or 2)
CAM_Power	On	8x 01 04 00 02 FF	2h	—	—	Power On/Off (Standby)
	Off (Standby)	8x 01 04 00 03 FF				
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	—	0h	7h	p = 0 (Low) to 7 (High)
	Wide (Variable)	8x 01 04 07 3p FF	—	0h	7h	
	Direct	8x 01 04 47 0p 0q 0r 0s FF	—	0000h	7AC0h	pqrs: Zoom Position
CAM_DZoom	On	8x 01 04 06 02 FF	2h	—	—	Digital Zoom On/Off
	Off	8x 01 04 06 03 FF				
	Combine Mode	8x 01 04 36 00 FF	0h	—	—	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	—	0h	7h	p = 0 (Low) to 7 (High) * Enabled during Separate Mode
	Wide (Variable)	8x 01 04 06 3p FF				
	Direct	8x 01 04 46 00 00 0p 0q FF	00h	00h	Ebh	pq: D-Zoom Position * Enabled during 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	—	0h	7h	p = 0 (Low) to 7 (High)
	Near (Variable)	8x 01 04 08 3p FF				
	Direct	8x 01 04 48 0p 0q 0r 0s FF	1000h	1000h	F000h	pqrs: Focus Position
	Auto Focus	8x 01 04 38 02 FF	02h	—	—	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
	Full Scan One Push Trigger	8x 01 04 18 03 FF	—	—	—	Full Scan One Push AF Trigger
	Near Limit	8x 01 04 28 0p 0q 0r 0s FF	9000h	1000h	F000h	pqrs: Focus Near Limit Position
CAM_AFSensitivity	Normal	8x 01 04 58 02 FF	2h	—	—	Changing AF Sensitivity
	Low	8x 01 04 58 03 FF				
CAM_AFMode	Normal AF	8x 01 04 57 00 FF	00h	—	—	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: 05h rs: 05h	pq: 00h rs: 00h	pq: FFh rs: FFh	pq: Movement Time rs: Interval

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Command List (2/7)

Command Set	Command	Command Packet	Initial	Min	Max	Comments
CAM_SpotFocus	On	8x 01 05 08 02 FF	3h	—	—	Spot Focus On (p = 2h)
	Off	8x 01 05 08 03 FF				Spot Focus Off (p = 3h)
	Set Parameter	8x 01 05 69 00 0p 0q 0r 0s FF	p: 3h q: 2h r: 5h s: 4h	p: 0h q: 0h r: 0h s: 0h	p: 8h q: 6h r: 8h s: 6h	Position/Size setting of detection frame Specifies the starting point (X1, Y1) and the terminating point (X2, Y2) for the Spot Focus position. p: X1, q: Y1, r: X2, s: Y2
	Display	8x 01 05 15 02 FF	3h	—	—	Spot Focus detection frame display On (p = 2h)
		8x 01 05 15 03 FF				Spot Focus detection frame display Off (p = 3h)
CAM_IRCorrection	Standard	8x 01 04 11 00 FF	0h	—	—	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: 0000h tuvw: 1000h	pqrs: 0000h tuvw: 1000h	pqrs: 7AC0h tuvw: F000h	pqrs: Zoom Position tuvw: Focus Position
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	00h	—	—	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
	ATW	8x 01 04 35 04 FF				Auto Tracing White Balance
	Manual	8x 01 04 35 05 FF				Manual Control mode
	One Push Trigger	8x 01 04 10 05 FF				One Push WB 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_WBSpeed	—	8x 01 04 56 0p FF	3h	1h	5h	p: Speed
CAM_WBOffset	Reset	8x 01 7E 01 2E 00 00 FF	—	—	—	WB Offset setting
	Up	8x 01 7E 01 2E 00 02 FF	—	—	—	
	Down	8x 01 7E 01 2E 00 03 FF	—	—	—	
	Direct	8x 01 7E 01 2E 01 0p FF	7h	0h	Eh	p: Offset
CAM_SpotAWB	On	8x 01 05 09 02 FF	3h	—	—	Spot AWB On (p = 2h)
	Off	8x 01 05 09 03 FF				Spot AWB Off (p = 3h)
	Set Parameter	8x 01 05 6B 00 0p 0q 0r 0s FF	p: 3h q: 2h r: 5h s: 4h	p: 0h q: 0h r: 0h s: 0h	p: 8h q: 6h r: 8h s: 6h	Position/Size setting of detection frame Specifies the starting point (X1, Y1) and the terminating point (X2, Y2) for the Spot AWB position. p: X1, q: Y1, r: X2, s: Y2
	Display	8x 01 05 17 0p FF	p: 3h	—	—	Spot AWB detection frame display On (p = 2h)
						Spot AWB detection frame display Off (p = 3h)
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	80h	00h	FFh	pq: R Gain

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Command List (3/7)

Command Set	Command	Command Packet	Initial	Min	Max	Comments
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	80h	00h	FFh	pq: B Gain
CAM_AE	Full Auto	8x 01 04 39 00 FF	0h	—	—	Full Auto
	Manual	8x 01 04 39 03 FF				Manual Control mode
	Shutter Priority	8x 01 04 39 0A FF				Shutter Priority mode
	Iris Priority	8x 01 04 39 0B FF				Iris Priority mode
CAM_AutoSlowShutter	On	8x 01 04 5A 02 FF	3h	—	—	Auto Slow Shutter On/Off
	Off	8x 01 04 5A 03 FF				
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
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
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
	Gain Limit	8x 01 04 2C 0p FF	—	—	—	p: Gain Position
CAM_ExpComp	On	8x 01 04 3E 02 FF	3h	—	—	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	07h	00h	0Eh	pq: ExpComp Position
CAM_BackLight	On	8x 01 04 33 02 FF	3h	—	—	Back Light Compensation On/Off
	Off	8x 01 04 33 03 FF				
CAM_SpotAE	On	8x 01 04 59 02 FF	3h	—	—	Spot AE Setting
	Off	8x 01 04 59 03 FF				
	Set Parameter	8x 01 05 6A 00 0p 0q 0r 0s FF	p: 3h q: 2h r: 5h s: 4h	p: 0h q: 0h r: 0h s: 0h	p: 8h q: 6h r: 8h s: 6h	Position/Size setting of detection frame Specifies the starting point (X1, Y1) and the terminating point (X2, Y2) for the Spot AE position. p: X1, q: Y1, r: X2, s: Y2
	Display	8x 01 05 16 0p FF	p: 3h	—	—	Spot AE detection frame display On (p = 2h)
						Spot AE detection frame display Off (p = 3h)
CAM_AE_Response	Direct	8x 01 04 5D pp FF	01h	01h	30h	pp: Slow AE Response Setting 01: The fastest convergence 30: The slowest convergence

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Command List (4/7)

Command Set	Command	Command Packet	Initial	Min	Max	Comments
CAM_VE	On	8x 01 04 3D 06 FF	3h	—	—	VE On
	Off	8x 01 04 3D 03 FF				Off (The Off command is the same for VE/Wide-D)
	Set Parameter	8x 01 04 2D 00 0q 0r 0s 00 00 00 00 FF	q: 3h r: 2h s: 1h	q: 0h r: 0h s: 0h	q: 6h r: 3h s: 2h	q: Display brightness level (0: Dark to 6: Bright) r: Brightness compensation (0: Darker areas, 1: Dark areas, 2: Standard, 3: Bright areas) s: Compensation level (0: Low, 1: Mid, 2: High)
CAM_WD	On	8x 01 04 3D 02 FF	3h	—	—	Wide-D On
	Off	8x 01 04 3D 03 FF				Off (The Off command is the same for VE/Wide-D)
	Set Parameter	8x 01 04 2D 00 0q 0r 0s 00 00 00 00 FF	q: 3h r: 2h s: 1h	q: 0h r: 0h s: 0h	q: 6h r: 3h s: 2h	q: Display brightness level (0: Dark to 6: Bright) r: Brightness compensation (0: Darker areas, 1: Dark areas, 2: Standard, 3: Bright areas) s: Compensation level (0: Low, 1: Mid, 2: High)
CAM_Defog	On	8x 01 04 37 02 0p FF	3h	—	—	Defog On/Off p: Defog level (1: Low, 2: Mid, 3: High)
	Off	8x 01 04 37 03 00 FF				
CAM_Aperture	Reset	8x 01 04 02 00 FF	—	—	—	Aperture Control setting
	Up	8x 01 04 02 02 FF	—	—	—	
	Down	8x 01 04 02 03 FF	—	—	—	
	Direct	8x 01 04 42 00 00 0p 0q FF	07h	00h	0Fh	pq: Aperture Gain
	Mode	8x 01 05 42 01 0p FF	0h	0h	1h	Select Auto (0)/Manual (1)
	Bandwidth	8x 01 05 42 02 0p FF	0h	0h	4h	p: Bandwidth setting (0: Default, 1: Low, 2: Middle, 3: Wide, 4: Wideband)
	Crispening	8x 01 05 42 03 0p FF	3h	0h	7h	p: Crispening
	B/W Balance	8x 01 05 42 05 0p FF	2h	0h	4h	p: B/W Balance
	Limit	8x 01 05 42 06 0p FF	3h	0h	7h	p: Limit
	HighLightDetail	8x 01 05 42 07 0p FF	0h	0h	4h	p: High light detail
CAM_NR	Noise Reduction	8x 01 04 53 pq FF	03h	00h	7Fh	pq: NR setting 00: Off 01 to 05: Level 1 to 5 7F: 2D/3D NR independent setting available
	2D/3D NR	8x 01 05 53 0p 0q FF	2D: 3h 3D: 3h	2D: 0h 3D: 0h	2D: 7h 3D: 5h	p: 2D NR level (0: Off, 1 to 7: level 1 to 7) q: 3D NR level (0: Off, 1 to 5: level 1 to 5)
CAM_Gamma	—	8x 01 04 5B 0p FF	p: 0h	0h	1h	p: Gamma Setting (0: Default, 1: Straight)
CAM_HighSensitivity	On	8x 01 04 5E 02 FF	3h	—	—	High Sensitivity mode On/Off
	Off	8x 01 04 5E 03 FF				
CAM_LR_Reverse	On	8x 01 04 61 02 FF	3h	—	—	LR Reverse On/Off
	Off	8x 01 04 61 03 FF				
CAM_Freeze	On	8x 01 04 62 02 FF	3h	—	—	Freeze On/Off
	Off	8x 01 04 62 03 FF				
CAM_PictureEffect	Off	8x 01 04 63 00 FF	0h	—	—	Picture Effect Setting
	Monochrome	8x 01 04 63 04 FF				Monochrome (black and white)

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Command List (5/7)

Command Set	Command	Command Packet	Initial	Min	Max	Comments
CAM_MinShutter	On	8x 01 04 12 02 FF	3h	—	—	pq: Minimum Shutter Position
	Off	8x 01 04 12 03 FF				
	Limit	8x 01 04 13 00 00 0p 0q FF	09h	05h	14h	
CAM_PictureFlip	On	8x 01 04 66 02 FF	3h	—	—	E-Flip On/Off
	Off	8x 01 04 66 03 FF				
CAM_ICR	On	8x 01 04 01 02 FF	3h	—	—	ICR Mode On/Off
	Off	8x 01 04 01 03 FF				
	On (Color)	8x 01 04 01 04 FF				ICR Mode On (Color)
CAM_AutoICR	On	8x 01 04 51 02 FF	3h	—	—	Auto ICR Mode On
	Off	8x 01 04 51 03 FF				Auto ICR Mode Off
	On (Color)	8x 01 04 51 04 FF				Auto ICR Mode On (Color)
	Threshold	8x 01 04 21 00 00 0p 0q FF	0Eh	00h	1Ch	pq: ICR On → Off Threshold Level
CAM_AutoICRAlarm Reply	On	8x 01 04 31 02 FF	3h	—	—	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	3h	—	—	Image Stabilizer On
	Off	8x 01 04 34 03 FF				Image Stabilizer Off
	Hold	8x 01 04 34 00 FF				Image Stabilizer Hold
	Level	8x 01 7E 04 34 0p FF	2h	0h	3h	p: 2 = Super, 3 = Super+
CAM_Memory	Reset	8x 01 7E 04 37 00 0p 0p FF	—	00h	FFh	pp: Memory Number
	Set	8x 01 7E 04 37 01 0p 0p FF	—	00h	FFh	
	Recall	8x 01 7E 04 37 02 0p 0p FF	—	00h	FFh	
	Delete	8x 01 7E 04 3C 00 00 FF	—	—	—	Initialize Preset completely
CAM_Custom	Reset	8x 01 04 3F 00 7F FF	—	—	—	Starts up in this mode when the power is turned on.
	Set	8x 01 04 3F 01 7F FF	—	—	—	
	Recall	8x 01 04 3F 02 7F FF	—	—	—	
CAM_MemSave	Write	8x 01 04 23 0X 0p 0q 0r 0s FF	X: — pqrs: 0000h	X: 0h pqrs: 0000h	X: 7h pqrs: FFFFh	X: 0 to 7 (Address), total 16 byte pqrs: 0000 to FFFF (Data)
CAM_Display	On	8x 01 04 15 02 FF (8x 01 06 06 02 FF)	3h	—	—	Display On/Off
	Off	8x 01 04 15 03 FF (8x 01 06 06 03 FF)				
	On/Off Switch	8x 01 04 15 10 FF (8x 01 06 06 10 FF)				
CAM_MultiLineTitle	Title Set1	8x 01 04 73 1L 00 nn pp qq 00 00 00 00 00 00 FF	—	L: 0h nn: 00h pp: 00h qq: 00h	L: Ah nn: 1Fh pp: 06h qq: 01h	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: 0h mm-ww: 00h	L: Ah mm-ww: 7Fh	L: Line Number mnpqrstuvw: Setting of characters (1 to 10)
	Title Set3	8x 01 04 73 3L mm nn pp qq rr ss tt uu vv ww FF	—	L: 0h mm-ww: 00h	L: Ah mm-ww: 7Fh	L: Line Number mnpqrstuvw: Setting of characters (11 to 20)
	Title Clear	8x 01 04 74 1p FF	—	0h	Fh	Title Setting clear (p: 0 to A, F = all lines)
	On	8x 01 04 74 2p FF	—	0h	Fh	Title display On/Off (p: 0 to A, F = all lines)
	Off	8x 01 04 74 3p FF	—	0h	Fh	
CAM_Mute	On	8x 01 04 75 02 FF	3h	—	—	Muting On/Off
	Off	8x 01 04 75 03 FF				
	On/Off	8x 01 04 75 10 FF				

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Command List (6/7)

Command Set	Command	Command Packet	Initial	Min	Max	Comments
CAM_PrivacyZone	SetMask	8x 01 04 76 mm nn 0r 0r 0s 0s FF	—	mm: 00h nn: 00h rr: 00h ss: 00h	mm: 17h nn: 01h rr: 50h ss: 2Dh	mm: Mask Settings nn: Type of setting (00: Modify, 01: New) rr: W ss: H
	Display	8x 01 04 77 pp pp pp pp FF	—	—	—	Mask Display On/Off pp pp pp pp: Mask Settings (0: Off, 1: On) The priority order of the mask display is in the sequence from A (highest) to X (lowest).
	SetMaskColor	8x 01 04 78 pp pp pp pp qq rr FF	—	—	—	pp pp pp pp: Mask Color Settings qq: Color Setting when 0 is selected rr: Color Setting when 1 is selected
	SetPanTiltAngle	8x 01 04 79 0p 0p 0p 0q 0q 0q FF	—	ppp: 000h qqq: 000h	ppp: FFFh qqq: FFFh	Pan/Tilt Angle Settings ppp: Pan qqq: Tilt
	SetPTZMask	8x 01 04 7B mm 0p 0p 0p 0q 0q 0q 0r 0r 0r 0r FF	—	mm: 00h ppp: 000h qqq: 000h rrrr: 0000h	mm: 17h ppp: FFFh qqq: FFFh rrrr: 4000h	Pan/Tilt/Zoom Settings for Mask mm: Mask Settings ppp: Pan qqq: Tilt rrrr: Zoom
	Non_InterlockMask	8x 01 04 6F mm 0p 0p 0q 0q 0r 0r 0s 0s FF	—	mm: 00h pp: –50h qq: –2Dh rr: 00h ss: 00h	mm: 17h pp: 50h qq: 2Dh rr: 50h ss: 2Dh	mm: Non_Interlock Mask Settings pp: X qq: Y rr: W ss: H
	CenterLineOff	8x 01 04 7C 03 FF	3h	—	—	Center Line Display Off
	CenterLineOn	8x 01 04 7C 04 FF				Center Line Display On
CAM_IDWrite	—	8x 01 04 22 0p 0q 0r 0s FF	0000h	0000h	FFFFh	pqrs: Camera ID
CAM_MD	On	8x 01 04 1B 02 FF	3h	—	—	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: — n: — pq: 10h rs: 01h	m: 0h n: 0h pq: 00h rs: 00h	m: 1h n: Fh pq: FFh rs: FFh	m: Display Mode n: Detection Frame Set pq: Threshold Level rs: Interval Time Set
	Window Set	8x 01 04 1D 0m pp qq rr ss FF	m: — pp: — qq: — rr: — ss: 0h	m: 0h pp: 00h qq: 00h rr: 01h ss: 01h	m: 3h pp: 0Fh qq: 0Bh rr: 10h ss: 0Ch	m: Select Detection Frame pp: Start Horizontal Position qq: Start Vertical Position rr: Stop Horizontal Position ss: Stop Vertical Position
	Alarm (Reply)	y0 07 04 1B 0p FF	—	—	—	p: Detection Frame Number
CAM_ContinuousZoom PosReply	On	8x 01 04 69 02 FF	3h	—	—	Zoom Position data Continuous 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 Zoom Mode is Combine qqqq: Zoom Position
CAM_ZoomPosReply IntervalTimeSet	—	8x 01 04 6A 00 00 0p 0p FF	3Ch	01h	FFh	pp: Interval Time [V cycle]
CAM_ContinuousFocus PosReply	On	8x 01 04 16 02 FF	3h	—	—	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	3Ch	01h	FFh	pp: Interval Time [V cycle]

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Command List (7/7)

Command Set	Command	Command Packet	Initial	Min	Max	Comments
CAM_RegisterValue	—	8x 01 04 24 mm 0p 0p FF	—	mm: 00h pp: 00h	mm: 7Fh pp: FFh	mm: Register No. pp: Register Value
CAM_ChromaSuppress	—	8x 01 04 5F pp FF	01h	00h	03h	pp: Chroma Suppress setting level 00: Off 01 to 03: On (3 levels). Effect increases as the level number increases.
CAM_ColorGain	Direct	8x 01 04 49 00 00 00 0p FF	4h	0h	Eh	p: Color Gain Setting
CAM_ColorHue	Direct	8x 01 04 4F 00 00 00 0p FF	7h	0h	Eh	p: Color Hue Setting
CAM_ExExpComp (Extended Commands)	Reset	8x 01 04 1F 0E 00 00 FF	—	—	—	Exposure compensation reset
	Up	8x 01 04 1F 0E 02 pp FF	—	00h	7Fh	Exposure compensation up pp: Step number (However, 00 is the same operation as 01.)
	Down	8x 01 04 1F 0E 03 pp FF	—	00h	7Fh	Exposure compensation down pp: Step number (However, 00 is the same operation as 01.)
	Direct	8x 01 04 1F 4E 00 00 0p 0q FF	80h	00h	FFh	Set the exposure compensation to the specified level pq: Level
CAM_ExAperture (Extended Commands)	Reset	8x 01 04 1F 02 00 00 FF	—	—	—	Aperture control reset
	Up	8x 01 04 1F 02 02 pp FF	—	00h	7Fh	Aperture control up pp: Step number (However, 00 is the same operation as 01.)
	Down	8x 01 04 1F 02 03 pp FF	—	00h	7Fh	Aperture control down pp: Step number (However, 00 is the same operation as 01.)
	Direct	8x 01 04 1F 42 00 00 0p 0q FF	C1h	00h	FFh	Set the aperture control to the specified level pq: Level
CAM_ExAutoICR (Extended Commands)	Threshold (On → Off)	8x 01 04 1F 21 00 00 0p 0q FF	0Eh	00h	FFh	pq: ICR On → Off threshold level when Auto ICR
	On Level	8x 01 04 1F 21 01 00 0r 0s FF	16h	00h	1Ch	rs: ICR Off → On threshold level when Auto ICR
CAM_ExColorGain (Extended Commands)	Direct	8x 01 04 1F 49 00 00 0p 0q FF	80h	00h	FFh	Color Gain Setting pq: Gain setting level
CAM_ExColorHue (Extended Commands)	Direct	8x 01 04 1F 4F 00 00 0p 0q FF	80h	00h	FFh	Color Hue Setting pq: Phase setting level
CAM_GammaOffset	Direct	8x 01 04 1E 00 00 00 0s 0t 0u FF	s: 0h tu: 00h	s: 0h tu: 00h	s: 1h tu: 40h	s: Polarity offset (0 is plus, 1 is minus) tu: Offset value (brightness) setting
CAM_ContrastAdjLevel	Direct	8x 01 05 5D 01 0p 0q FF	80h	00h	FFh	pq: 00 to 7F: The smaller the value is, the lower the contrast becomes. 80: No contrast adjustment 81 to FF: The larger the value is, the higher the contrast becomes.
CAM_HLC	Parameter Set	8x 01 04 14 0p 0q FF	p: 0h q: 0h	p: 0h q: 0h	p: 3h q: 3h	p: HLC level (0: Off, 1: Low, 2: Mid, 3: High) q: HLC mask level (0: Off, 1: Low, 2: Mid, 3: High)
CAM_FlickerReduction	On	8x 01 04 32 02 FF	3h	—	—	Flicker reduction On/Off
	Off	8x 01 04 32 03 FF				
CAM_FactoryReset	—	8x 01 7E 07 05 01 FF	—	—	—	Perform Factory Reset

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Inquiry Command List (1/4)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_PowerInq	8x 09 04 00 FF	y0 50 02 FF	On
		y0 50 03 FF	Off (Standby)
CAM_ZoomPosInq	8x 09 04 47 FF	y0 50 0p 0q 0r 0s FF	pqrs: Zoom Position
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 Position
CAM_SpotFocusModeInq	8x 09 05 08 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_SpotFocusParameterInq	8x 09 05 69 00 FF	y0 50 0p 0q 0r 0s FF	Position/Size setting of detection frame The position of the Spot Focus at the starting point (X1, Y1) and the terminating point (X2, Y2). p: X1, q: Y1, r: X2, s: Y2
CAM_SpotFocusDispInq	8x 09 05 15 FF	y0 50 02 FF	Spot Focus display On
		y0 50 03 FF	Spot Focus display Off
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_AFTimeSettingInq	8x 09 04 27 FF	y0 50 0p 0q 0r 0s FF	pq: Movement Time rs: Interval
CAM_SpotAWBModeInq	8x 09 05 09 FF	y0 50 02 FF	Spot AWB On
		y0 50 03 FF	Spot AWB Off
CAM_SpotAWBParameterInq	8x 09 05 6B 00 FF	y0 50 0p 0q 0r 0s FF	Position/Size setting of detection frame The position of the Spot AWB at the starting point (X1, Y1) and the terminating point (X2, Y2). p: X1, q: Y1, r: X2, s: Y2
CAM_SpotAWBDispInq	8x 09 05 17 FF	y0 50 02 FF	Spot AWB display On
		y0 50 03 FF	Spot AWB display Off
CAM_IRCorrectionInq	8x 09 04 11 FF	y0 50 00 FF	Standard
		y0 50 01 FF	IR Light
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 WB
		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_WBSpeedInq	8x 09 04 56 FF	y0 50 0p FF	p: Speed
CAM_WBOffsetInq	8x 09 7E 01 2E FF	y0 50 00 00 00 0p FF	p: Offset
CAM_RGainInq	8x 09 04 43 FF	y0 50 00 00 0p 0q FF	pq: R Gain
CAM_BGainInq	8x 09 04 44 FF	y0 50 00 00 0p 0q FF	pq: B Gain

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Inquiry Command List (2/4)

Inquiry Command	Command Packet	Inquiry Packet	Comments
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
CAM_AutoSlowShutterInq	8x 09 04 5A FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ShutterPosInq	8x 09 04 4A FF	y0 50 00 00 0p 0q FF	pq: Shutter Position
CAM_IrisPosInq	8x 09 04 4B FF	y0 50 00 00 0p 0q FF	pq: Iris Position
CAM_GainPosInq	8x 09 04 4C FF	y0 50 00 00 0p 0q FF	pq: Gain Position
CAM_GainLimitInq	8x 09 04 2C FF	y0 50 0p FF	p: Gain Limit
CAM_ExpCompModeInq	8x 09 04 3E FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ExpCompPosInq	8x 09 04 4E FF	y0 50 00 00 0p 0q FF	pq: ExpComp Position
CAM_BackLightModeInq	8x 09 04 33 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_SpotAEModeInq	8x 09 04 59 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_SpotAEParameterInq	8x 09 05 6A 00 FF	y0 50 0p 0q 0r 0s FF	Position/Size setting of detection frame The position of the Spot AE at the starting point (X1, Y1) and the terminating point (X2, Y2). p: X1, q: Y1, r: X2, s: Y2
CAM_SpotAEDispInq	8x 09 05 16 FF	y0 50 02 FF	Spot AE display On
		y0 50 03 FF	Spot AE display Off
CAM_VEModeInq	8x 09 04 3D FF	y0 50 03 FF	Off
		y0 50 06 FF	VE On
CAM_VEParameterInq	8x 09 04 2D FF	y0 50 00 0q 0r 0s 00 00 00 00 FF	q: Display brightness level (0: Dark to 6: Bright) r: Brightness compensation (0: Darker areas, 1: Dark areas, 2: Standard, 3: Bright areas) s: Compensation level (0: Low, 1: Mid, 2: High)
CAM_WDModeInq	8x 09 04 3D FF	y0 50 02 FF	Wide-D On
		y0 50 03 FF	Off
CAM_WDParameterInq	8x 09 04 2D FF	y0 50 00 0q 0r 0s 00 00 00 00 FF	q: Display brightness level (0: Dark to 6: Bright) r: Brightness compensation (0: Darker areas, 1: Dark areas, 2: Standard, 3: Bright areas) s: Compensation level (0: Low, 1: Mid, 2: High)
CAM_AEResponseInq	8x 09 04 5D FF	y0 50 pp FF	pp: Slow AE Response Setting
CAM_DefogInq	8x 09 04 37 FF	y0 50 02 0p FF	p: Defog level (1: Low, 2: Mid, 3: High)
		y0 50 03 00 FF	Defog Off
CAM_ApertureInq	8x 09 04 42 FF	y0 50 00 00 0p 0q FF	pq: Aperture Gain
CAM_ApertureModeInq	8x 09 05 42 01 FF	y0 50 0p FF	p: Auto (0), Manual (1)
CAM_ApertureBandwidthInq	8x 09 05 42 02 FF	y0 50 0p FF	p: Bandwidth setting
CAM_ApertureCrispeningInq	8x 09 05 42 03 FF	y0 50 0p FF	p: Crispening
CAM_ApertureB/WBalanceInq	8x 09 05 42 05 FF	y0 50 0p FF	p: B/W Balance
CAM_ApertureLimitInq	8x 09 05 42 06 FF	y0 50 0p FF	p: Limit
CAM_ApertureHighLightDetailInq	8x 09 05 42 07 FF	y0 50 0p FF	p: High light detail
CAM_NRInq	8x 09 04 53 FF	y0 50 pq FF	pq: NR level 00: Off 01 to 05: Level 1 to 5 7F: 2D/3D NR independent setting available

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Inquiry Command List (3/4)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_NR2D3DInq	8x 09 05 53 FF	y0 50 0p 0q FF	p: 2D NR level (0: Off, 1 to 7: level 1 to 7) q: 3D NR level (0: Off, 1 to 5: level 1 to 5)
CAM_GammaInq	8x 09 04 5B FF	y0 50 0p FF	p: Gamma Setting (0: Default, 1: Straight)
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
		y0 50 04 FF	Monochrome
CAM_PictureFlipModeInq	8x 09 04 66 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_ICRModeInq	8x 09 04 01 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
		y0 50 04 FF	ICR Mode On (Color)
CAM_AutoICRModeInq	8x 09 04 51 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
		y0 50 04 FF	Auto ICR Mode On (Color)
CAM_AutoICRThresholdInq	8x 09 04 21 FF	y0 50 00 00 0p 0q FF	pq: ICR On → Off Threshold Level
CAM_AutoICRAlarmReplyInq	8x 09 04 31 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
(Reply)	—	y0 07 04 31 02 FF	ICR Off → On
		y0 07 04 31 03 FF	ICR On → Off
CAM_MemoryInq	8x 09 7E 04 37 FF	y0 50 pq 0q FF	p: 0 = Perform Memory Recall, 1 = Perform Custom Recall qq: Memory Preset number 00 to FF (when p is set to 1, qq will be 00)
CAM_MemSaveInq	8x 09 04 23 0X FF	y0 50 0p 0q 0r 0s FF	X: 0 to 7 (Address) pqrs: 0000 to FFFF (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 50 02 FF	On
		y0 50 03 FF	Off
		y0 50 00 FF	Hold
CAM_StabilizerLevelInq	8x 09 7E 04 34 FF	y0 50 0p FF	p: 2 = Super, 3 = Super+
CAM_MuteModeInq	8x 09 04 75 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_PrivacyDisplayInq	8x 09 04 77 FF	y0 50 pp pp pp pp FF	pp pp pp pp: Mask Display (0: Off, 1: On)
CAM_PrivacyPanTiltInq	8x 09 04 79 FF	y0 50 0p 0p 0p 0q 0q 0q FF	ppp: Pan qqq: Tilt
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	pp pp pp pp: Mask is displayed now.
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 mn pq rs tu vw FF	mnpq: Model Code 0712: FCB-ER9100 rstu: ROM version vw: Socket Number
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 pq: Threshold Level rs: Interval Time Set

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Inquiry Command List (4/4)

Inquiry Command	Command Packet	Inquiry Packet	Comments
CAM_MDWindowInq	8x 09 04 1D 0m FF	y0 50 pp qq rr ss FF	m: Select Detection Frame pp: Start Horizontal Position qq: Start Vertical Position rr: Stop Horizontal Position ss: Stop Vertical Position
CAM_ContinuousZoomPos ReplyModeInq	8x 09 04 69 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
(Reply)	—	y0 07 04 69 0p 0p 0q 0q 0q 0q FF	—
CAM_ZoomPosReply IntervalTimeInq	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
(Reply)	—	y0 07 04 16 00 00 0p 0p 0p 0p FF	—
CAM_FocusPosReply 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. pp: Register Value
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
CAM_ColorHueInq	8x 09 04 4F FF	y0 50 00 00 00 0p FF	p: Color Hue Setting
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
CAM_ContrastAdjLevelInq	8x 09 05 5D FF	y0 50 0p 0q FF	pq: Contrast adjustment value
CAM_ExExpCompPosInq	8x 09 04 1F 4E FF	y0 50 00 00 0p 0q FF	pq: Exposure compensation level
CAM_ExApertureInq	8x 09 04 1F 42 FF	y0 50 00 00 0p 0q FF	pq: Aperture control level
CAM_ExColorGainInq	8x 09 04 1F 49 00 FF	y0 50 0p 0q FF	pq: Gain setting level
CAM_ExColorHueInq	8x 09 04 1F 4F 00 FF	y0 50 0p 0q FF	pq: Phase setting level
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
CAM_ExAutoICROnLevelInq	8x 09 04 1F 21 01 FF	y0 50 00 00 0p 0q FF	pq: ICR Off → On threshold level when Auto ICR
CAM_MinShutterInq	8x 09 04 12 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_MinShutterLimitInq	8x 09 04 13 FF	y0 50 00 00 0p 0q FF	pq: Minimum Shutter Position
CAM_HLCInq	8x 09 04 14 FF	y0 50 0p 0q FF	p: HLC level q: HLC mask level
CAM_FlickerReductionInq	8x 09 04 32 FF	y0 50 02 FF	On
		y0 50 03 FF	Off
CAM_FlickerDetectionInq	8x 09 05 41 01 FF	y0 50 00 FF	p = 0: Indefinite
		y0 50 01 FF	p = 1: Without flicker
		y0 50 02 FF	p = 2: With flicker
CAM_AFStatusInq	8x 09 7E 04 18 FF	y0 50 00 FF	p = 0: Evacuation
		y0 50 01 FF	p = 1: Completion
		y0 50 02 FF	p = 2: In operation
		y0 50 03 FF	p = 3: Other than AF

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Block Inquiry Command List

Lens Control System Inquiry Commands..... Command Packet 8x 09 7E 7E 00 FF

Byte	Bit	Comments
0	7	Destination Address
	6	
	5	
	4	
	3	Source Address
	2	
	1	
	0	
1	7	0 Completion Message (50h)
	6	1
	5	0
	4	1
	3	0
	2	0
	1	0
	0	0
2	7	0
	6	0
	5	0
	4	0
	3	Zoom Position (HH)
	2	
	1	
	0	
3	7	0
	6	0
	5	0
	4	0
	3	Zoom Position (HL)
	2	
	1	
	0	
4	7	0
	6	0
	5	0
	4	0
	3	Zoom Position (LH)
	2	
	1	
	0	
5	7	0
	6	0
	5	0
	4	0
	3	Zoom Position (LL)
	2	
	1	
	0	

Byte	Bit	Comments
6	7	0
	6	0
	5	0
	4	0
	3	Focus Near Limit (H)
	2	
	1	
	0	
7	7	0
	6	0
	5	0
	4	0
	3	Focus Near Limit (L)
	2	
	1	
	0	
8	7	0
	6	0
	5	0
	4	0
	3	Focus Position (HH)
	2	
	1	
	0	
9	7	0
	6	0
	5	0
	4	0
	3	Focus Position (HL)
	2	
	1	
	0	
10	7	0
	6	0
	5	0
	4	0
	3	Focus Position (LH)
	2	
	1	
	0	
11	7	0
	6	0
	5	0
	4	0
	3	Focus Position (LL)
	2	
	1	
	0	

Byte	Bit	Comments
12	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
13	7	0
	6	0
	5	D-Zoom Mode 0: Combine 1: Separate
	4	AF Mode 0: Normal
	3	1: Interval 2: Zoom Trigger
	2	AF Sensitivity 0: Low 1: Normal
	1	Digital Zoom 1: On 0: Off
	0	Focus Mode 1: Auto 0: Manual
14	7	0
	6	0
	5	0
	4	0
	3	Low Contrast Detection 1: Yes 0: No
	2	Camera Memory Recall 1: Executing 0: Stopped
	1	Focus Command 1: Executing 0: Stopped
	0	Zoom Command 1: Executing 0: Stopped
15	7	1 Terminator (FFh)
	6	1
	5	1
	4	1
	3	1
	2	1
	1	1
	0	1

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Camera Control System Inquiry Commands ..... Command Packet 8x 09 7E 7E 01 FF

Byte	Bit	Comments
0	7	Destination Address
	6	
	5	
	4	
	3	Source Address
	2	
	1	
	0	
1	7	0 Completion Message (50h)
	6	1
	5	0
	4	1
	3	0
	2	0
	1	0
	0	0
2	7	0
	6	0
	5	0
	4	0
	3	R Gain (H)
	2	
	1	
	0	
3	7	0
	6	0
	5	0
	4	0
	3	R Gain (L)
	2	
	1	
	0	
4	7	0
	6	0
	5	0
	4	0
	3	B Gain (H)
	2	
	1	
	0	
5	7	0
	6	0
	5	0
	4	0
	3	B Gain (L)
	2	
	1	
	0	

Byte	Bit	Comments
6	7	0
	6	0
	5	0
	4	0
	3	WB Mode
	2	
	1	
	0	
7	7	0
	6	0
	5	0
	4	0
	3	Aperture Gain
	2	
	1	
	0	
8	7	0
	6	0
	5	0
	4	Exposure Mode
	3	
	2	
	1	
	0	
9	7	0
	6	Spot Focus 1: On 0: Off
	5	0
	4	VE 1: On 0: Off Wide-D (1: Other than Off, 0: Off)
	3	Spot AE 1: On 0: Off
	2	Back Light 1: On 0: Off
	1	Exposure Comp. 1: On 0: Off
	0	Slow Shutter 1: On 0: Off
10	7	0
	6	Spot AWB 1: On 0: Off
	5	0
	4	Shutter Position
	3	
	2	
	1	
	0	

Byte	Bit	Comments
11	7	0
	6	0
	5	0
	4	Iris Position
	3	
	2	
	1	
	0	
12	7	0
	6	0
	5	0
	4	0
	3	Gain Position
	2	
	1	
	0	
13	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
14	7	0
	6	0
	5	0
	4	0
	3	Exposure Comp. Position
	2	
	1	
	0	
15	7	1 Terminator (FFh)
	6	1
	5	1
	4	1
	3	1
	2	1
	1	1
	0	1

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Other Inquiry Commands ..... Command Packet 8x 09 7E 7E 02 FF

Byte	Bit	Comments
0	7	Destination Address
	6	
	5	
	4	
	3	Source Address
	2	
	1	
	0	
1	7	0 Completion Message (50h)
	6	1
	5	0
	4	1
	3	0
	2	0
	1	0
	0	0
2	7	0
	6	0
	5	0
	4	ICR Mode (1: Color, 0: BW)
	3	Auto ICR Alarm (1: On, 0: Off)
	2	Auto ICR 3: Color
	1	Auto ICR 2: On 0: Off
	0	Power 1: On 0: Off
3	7	0
	6	Stabilizer 1: On 0: Off
	5	Stabilizer Hold 1: Hold 0: Off
	4	ICR 1: On 0: Off
	3	Freeze 1: On 0: Off
	2	LR Reverse 1: On 0: Off
	1	Stabilizer Level
	0	2 = Super 3 = Super+
4	7	0
	6	0
	5	Privacy Zone 1: On 0: Off
	4	Mute 1: On 0: Off
	3	Title Display 1: On 0: Off
	2	Display 1: On 0: Off
	1	0
	0	0
5	7	0
	6	0
	5	0
	4	0
	3	Picture Effect Mode
	2	
	1	
	0	

Byte	Bit	Comments
6	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
7	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
8	7	0
	6	0
	5	0
	4	0
	3	Camera ID (HH)
	2	
	1	
	0	
9	7	0
	6	0
	5	0
	4	0
	3	Camera ID (HL)
	2	
	1	
	0	
10	7	0
	6	0
	5	0
	4	0
	3	Camera ID (LH)
	2	
	1	
	0	
11	7	0
	6	0
	5	0
	4	0
	3	Camera ID (LL)
	2	
	1	
	0	

Byte	Bit	Comments
12	7	0
	6	0
	5	0
	4	Memory 1: Provided 0: Not provided
	3	0
	2	ICR 1: Provided 0: Not provided
	1	Stabilizer 1: Provided 0: Not provided
	0	System 1: 1/50, 1/25 0: 1/60, 1/30
13	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
14	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
15	7	1 Terminator (FFh)
	6	1
	5	1
	4	1
	3	1
	2	1
	1	1
	0	1

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Extended Function 1 Inquiry Commands ..... Command Packet 8x 09 7E 7E 03 FF

Byte	Bit	Comments
0	7	Destination Address
	6	
	5	
	4	
	3	Source Address
	2	
	1	
	0	
1	7	0 Completion Message (50h)
	6	1
	5	0
	4	1
	3	0
	2	0
	1	0
	0	0
2	7	0
	6	0
	5	0
	4	0
	3	Digital Zoom Position (H)
	2	
	1	
	0	
3	7	0
	6	0
	5	0
	4	0
	3	Digital Zoom Position (L)
	2	
	1	
	0	
4	7	0
	6	0
	5	0
	4	0
	3	AF Movement Time (H)
	2	
	1	
	0	
5	7	0
	6	0
	5	0
	4	0
	3	AF Movement Time (L)
	2	
	1	
	0	

Byte	Bit	Comments
6	7	0
	6	0
	5	0
	4	0
	3	AF Interval Time (H)
	2	
	1	
	0	
7	7	0
	6	0
	5	0
	4	0
	3	AF Interval Time (L)
	2	
	1	
	0	
8	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
9	7	0
	6	2D NR level
	5	(The value p of the CAM_
	4	NR2D3DInq return value pq is stored.)
	3	0
	2	3D NR level
	1	(The value q of the CAM_
	0	NR2D3DInq return value pq is stored.)
10	7	0
	6	0
	5	0
	4	0
	3	0
	2	MD (1: On, 0: Off)
	1	0
	0	E-Flip (1: On, 0: Off)

Byte	Bit	Comments
11	7	0
	6	Color Gain (0h to Eh)
	5	
	4	
	3	
	2	Advanced Privacy (1: Provided, 0: Not provided)
	1	Reserved
	0	E-Flip (1: Provided, 0: Not provided)
12	7	0
	6	0
	5	0
	4	AE Response
	3	
	2	
	1	
	0	
13	7	0
	6	Gamma
	5	
	4	
	3	High Sensitivity mode (1: On, 0: Off)
	2	NR Level (The lower 3 bits of the CAM_ NRInq return value pq are stored.)
	1	
	0	
14	7	0
	6	Chroma Suppress
	5	
	4	
	3	Gain Limit
	2	
	1	
	0	
15	7	1 Terminator (FFh)
	6	1
	5	1
	4	1
	3	1
	2	1
	1	1
	0	1

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Extended Function 2 Inquiry Commands ..... Command Packet 8x 09 7E 7E 04 FF

Byte	Bit	Comments
0	7	Destination Address
	6	
	5	
	4	
	3	Source Address
	2	
	1	
	0	
1	7	0 Completion Message (50h)
	6	1
	5	0
	4	1
	3	0
	2	0
	1	0
	0	0
2	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	Wide-D
	0	0: Off 1: On 2: VE On
3	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
4	7	0
	6	0
	5	0
	4	0
	3	0
	2	Display brightness level setting
	1	0: Dark to 6: Bright
	0	
5	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	Brightness compensation
	0	0: Darker areas 1: Dark areas
		2: Standard 3: Bright areas

Byte	Bit	Comments
6	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	Compensation level
	0	0: Low 1: Mid 2: High
7	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	Defog 0: Off 1: On
8	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	Defog Level
	0	1: Low 2: Mid 3: High
9	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
10	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0

Byte	Bit	Comments
11	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
12	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
13	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
14	7	0
	6	0
	5	0
	4	0
	3	0
	2	0
	1	0
	0	0
15	7	1 Terminator (FFh)
	6	1
	5	1
	4	1
	3	1
	2	1
	1	1
	0	1

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Extended Function 3 Inquiry Commands ..... Command Packet 8x 09 7E 7E 05 FF

Byte	Bit	Comments
0	7	Destination Address
	6	
	5	
	4	
	3	Source Address
	2	
	1	
	0	
1	7	0 Completion Message (50h)
	6	1
	5	0
	4	1
	3	0
	2	0
	1	0
	0	0
2	7	0
	6	0
	5	0
	4	0
	3	Color Hue (0h to Eh)
	2	
	1	
	0	
3	7	0
	6	Spot AE (starting point) q
	5	
	4	
	3	Spot AE (starting point) p
	2	
	1	
	0	
4	7	0
	6	Spot AE (terminating point) s
	5	
	4	
	3	Spot AE (terminating point) r
	2	
	1	
	0	
5	7	0
	6	Spot Focus (starting point) q
	5	
	4	
	3	Spot Focus (starting point) p
	2	
	1	
	0	

Byte	Bit	Comments
6	7	0
	6	Spot Focus (terminating point) s
	5	
	4	
	3	Spot Focus (terminating point) r
	2	
	1	
	0	
7	7	0
	6	Spot AWB (starting point) q
	5	
	4	
	3	Spot AWB (starting point) p
	2	
	1	
	0	
8	7	0
	6	Spot AWB (terminating point) s
	5	
	4	
	3	Spot AWB (terminating point) r
	2	
	1	
	0	
9	7	0
	6	Reserved
	5	
	4	
	3	
	2	
	1	
	0	
10	7	0
	6	Reserved
	5	
	4	
	3	
	2	
	1	
	0	
11	7	0
	6	Reserved
	5	
	4	
	3	
	2	
	1	
	0	

Byte	Bit	Comments
12	7	0
	6	Reserved
	5	
	4	
	3	
	2	
	1	
	0	
13	7	0
	6	Reserved
	5	
	4	
	3	
	2	
	1	
	0	
14	7	0
	6	Reserved
	5	
	4	
	3	
	2	
	1	
	0	
15	7	1 Terminator (FFh)
	6	1
	5	1
	4	1
	3	1
	2	1
	1	1
	0	1

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VISCA Command Setting Values

Exposure control (1/2)

		59.94/29.97 mode	50/25 mode
Shutter Speed	15	1/10000	1/10000
	14	1/6000	1/6000
	13	1/4000	1/3500
	12	1/3000	1/2500
	11	1/2000	1/1750
	10	1/1500	1/1250
	0F	1/1000	1/1000
	0E	1/725	1/600
	0D	1/500	1/425
	0C	1/350	1/300
	0B	1/250	1/215
	0A	1/180	1/150
	09	1/125	1/120
	08	1/100	1/100
	07	1/90	1/75
	06	1/60	1/50
	05	1/30	1/25
	04	1/15	1/12
	03	1/8	1/6
	02	1/4	1/3
	01	1/2	1/2
	00	1/1	1/1

Iris

Zoom Position (VISCA value)	Iris value (VISCA value)												
	11	10	0F	0E	0D	0C	0B	0A	09	08	07	06	05
0000	F1.8	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0100	F1.8	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0200	F1.8	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0300	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0400	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0500	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0600	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0700	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0800	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0900	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0A00	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0B00	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0C00	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0D00	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0E00	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
0F00	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1000	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1100	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1200	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1300	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1400	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1500	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1600	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1700	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1800	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1900	F2	F2	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1A00	F2.4	F2.4	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1B00	F2.4	F2.4	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1C00	F2.4	F2.4	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1D00	F2.4	F2.4	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1E00	F2.4	F2.4	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
1F00	F2.4	F2.4	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
2000	F2.4	F2.4	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14
2100	F2.4	F2.4	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F16
2200	F2.4	F2.4	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F11	F11	F16
2300	F2.4	F2.4	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F11	F11	F16

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Zoom Position (VISCA value)	Iris value (VISCA value)												
	11	10	0F	0E	0D	0C	0B	0A	09	08	07	06	05
2400	F2.4	F2.4	F2.4	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F11	F11	F16
2500	F2.4	F2.4	F2.8	F2.8	F3.4	F4	F5.6	F5.6	F6.8	F8	F11	F11	F16
2600	F2.4	F2.4	F2.8	F2.8	F3.4	F4	F5.6	F5.6	F6.8	F8	F11	F11	F16
2700	F2.4	F2.4	F2.8	F2.8	F4	F4	F5.6	F5.6	F8	F8	F11	F11	F16
2800	F2.4	F2.4	F2.8	F2.8	F4	F4	F5.6	F5.6	F8	F8	F11	F11	F16
2900	F2.4	F2.4	F2.8	F2.8	F4	F4	F5.6	F5.6	F8	F8	F11	F11	F16
2A00	F2.4	F2.4	F2.8	F2.8	F4	F4.8	F5.6	F5.6	F8	F9.6	F11	F11	F16
2B00	F2.4	F2.4	F2.8	F2.8	F4	F4.8	F5.6	F5.6	F8	F9.6	F11	F11	F16
2C00	F2.8	F2.8	F2.8	F2.8	F4	F4.8	F5.6	F5.6	F8	F9.6	F11	F11	F16
2D00	F2.8	F2.8	F2.8	F2.8	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F11	F16
2E00	F2.8	F2.8	F2.8	F2.8	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F11	F16
2F00	F2.8	F2.8	F2.8	F2.8	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F11	F16
3000	F2.8	F2.8	F2.8	F2.8	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F11	F16
3100	F2.8	F2.8	F2.8	F2.8	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F11	F16
3200	F2.8	F2.8	F2.8	F2.8	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F11	F16
3300	F2.8	F2.8	F2.8	F2.8	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F11	F16
3400	F2.8	F2.8	F2.8	F2.8	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F11	F16
3500	F2.8	F2.8	F2.8	F2.8	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F11	F16
3600	F2.8	F2.8	F2.8	F2.8	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14	F16
3700	F2.8	F2.8	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14	F16
3800	F2.8	F2.8	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14	F16
3900	F2.8	F2.8	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14	F16
3A00	F2.8	F2.8	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14	F16
3B00	F2.8	F2.8	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14	F16
3C00	F2.8	F2.8	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14	F16
3D00	F2.8	F2.8	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14	F16
3E00	F2.8	F2.8	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14	F16
3F00	F2.8	F2.8	F2.8	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14	F16
4000	F3.4	F3.4	F3.4	F3.4	F4	F4.8	F5.6	F6.8	F8	F9.6	F11	F14	F16

		High Sensitivity mode		Step
		Off	On	
Gain	0F	50.0 dB	70.0 dB	28
	0E	46.4 dB	65.0 dB	26
	0D	42.9 dB	60.0 dB	24
	0C	39.3 dB	55.0 dB	22
	0B	35.7 dB	50.0 dB	20
	0A	32.1 dB	45.0 dB	18
	09	28.6 dB	40.0 dB	16
	08	25.0 dB	35.0 dB	14
	07	21.4 dB	30.0 dB	12
	06	17.9 dB	25.0 dB	10
	05	14.3 dB	20.0 dB	8
	04	10.7 dB	15.0 dB	6
	03	7.1 dB	10.0 dB	4
	02	3.6 dB	5.0 dB	2
	01	0 dB	0 dB	0

		High Sensitivity mode		Step
		Off	On	
Gain Limit	0F	50.0 dB	70.0 dB	28
	0E	46.4 dB	65.0 dB	26
	0D	42.9 dB	60.0 dB	24
	0C	39.3 dB	55.0 dB	22
	0B	35.7 dB	50.0 dB	20
	0A	32.1 dB	45.0 dB	18
	09	28.6 dB	40.0 dB	16
	08	25.0 dB	35.0 dB	14
	07	21.4 dB	30.0 dB	12
	06	17.9 dB	25.0 dB	10
	05	14.3 dB	20.0 dB	8
	04	10.7 dB	15.0 dB	6

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Exposure control (2/2)

Exposure Comp.	0E	+7	+10.5 dB
	0D	+6	+9 dB
	0C	+5	+7.5 dB
	0B	+4	+6 dB
	0A	+3	+4.5 dB
	09	+2	+3 dB
	08	+1	+1.5 dB
	07	0	0 dB
	06	−1	−1.5 dB
	05	−2	−3 dB
	04	−3	−4.5 dB
	03	−4	−6 dB
	02	−5	−7.5 dB
	01	−6	−9 dB
	00	−7	−10.5 dB

Zoom Ratio and Zoom Position (for reference)

Optical Zoom Ratio	Optical Zoom Position Data
1×	0000
2×	1998
3×	258B
4×	2CEC
5×	321D
6×	360F
7×	3936
8×	3BD3
9×	3E0E
10×	4000

Digital Zoom Combine mode

Digital Zoom Ratio	Digital Zoom Position Data
1×	4000
2×	6000
3×	6AAB
4×	7000
5×	7334
6×	7556
7×	76DC
8×	7800
9×	78E4
10×	799A
11×	7A2F
12×	7AC0

Digital Zoom Separate mode

Digital Zoom Ratio	Digital Zoom Position Data
1×	00
2×	80
3×	AA
4×	C0
5×	CC
6×	D5
7×	DB
8×	E0
9×	E3
10×	E6
11×	E8
12×	EB

Lens control

Zoom Position	0000 Wide end	to	4000 Tele end	to	7AC0 Digital Tele end
Focus Position	1000 Far end	to	F000 Near end		

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Focus Near Limit

Focus Near Limit (VISCA value)	Zoom Position (VISCA value)										
	0000	3040	3400	35C1	3800	3940	3A00	3B00	3C40	3E00	4000
1000	Over Inf	Over Inf	Over Inf	Over Inf	Over Inf	Over Inf	Over Inf	Over Inf	Over Inf	Over Inf	Over Inf
1400	Inf	Inf	Inf	Inf	Inf	Inf	Inf	Inf	Inf	Inf	Inf
2000	10 m	10 m	10 m	10 m	10 m	10 m	10 m	10 m	10 m	10 m	10 m
3000	5 m	5 m	5 m	5 m	5 m	5 m	5 m	5 m	5 m	5 m	5 m
4000	2.4 m	2.4 m	2.4 m	2.4 m	2.4 m	2.4 m	2.4 m	2.4 m	2.4 m	2.4 m	2.4 m
5000	1.2 m	1.2 m	1.2 m	1.2 m	1.2 m	1.2 m	1.2 m	1.2 m	1.2 m	1.2 m	1.2 m
6000	80 cm	80 cm	80 cm	80 cm	80 cm	80 cm	80 cm	80 cm	80 cm	80 cm	80 cm
7000	55 cm	55 cm	55 cm	55 cm	55 cm	55 cm	55 cm	55 cm	55 cm	80 cm	80 cm
8000	42 cm	42 cm	42 cm	42 cm	42 cm	42 cm	42 cm	42 cm	55 cm	80 cm	80 cm
9000	35 cm	35 cm	35 cm	35 cm	35 cm	35 cm	35 cm	42 cm	55 cm	80 cm	80 cm
A000	30 cm	30 cm	30 cm	30 cm	30 cm	30 cm	35 cm	42 cm	55 cm	80 cm	80 cm
B000	24 cm	24 cm	24 cm	24 cm	24 cm	30 cm	35 cm	42 cm	55 cm	80 cm	80 cm
C000	15 cm	15 cm	15 cm	15 cm	24 cm	30 cm	35 cm	42 cm	55 cm	80 cm	80 cm
D000	10 cm	10 cm	10 cm	15 cm	24 cm	30 cm	35 cm	42 cm	55 cm	80 cm	80 cm
E000	5 cm	5 cm	10 cm	10 cm	24 cm	30 cm	35 cm	42 cm	55 cm	80 cm	80 cm
F000	1 cm	5 cm	10 cm	10 cm	24 cm	30 cm	35 cm	42 cm	55 cm	80 cm	80 cm

Wide/Tele Limit Setting

Wide/Tele Limit Setting Value	Wide Limit		Tele Limit	
Limit Setting Value	Zoom Position	Zoom Ratio	Zoom Position	Zoom Ratio
00	0000	1.00	4000	10.00
10	0103	1.02	3EFC	9.46
20	0206	1.05	3DF9	8.96
30	0309	1.07	3CF6	8.49
40	040C	1.10	3BF3	8.05
50	050F	1.13	3AF0	7.64
60	0612	1.16	39ED	7.26
70	0715	1.19	38EA	6.90
80	0818	1.22	37E7	6.56
90	091B	1.25	36E4	6.24
A0	0A1E	1.29	35E1	5.95
B0	0B21	1.32	34DE	5.67
C0	0C24	1.36	33DB	5.41
D0	0D27	1.39	32D8	5.17
E0	0E2A	1.43	31D5	4.94
F0	0F2D	1.47	30D2	4.72
FF	101F	1.51	2FE0	4.53

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Register Setting

Register name	Register No.	Setting value		Setting value reflection timing*1
VISCA Baud Rate	00	00 (Initial Setting)	9600 bps	Reflected after camera reset
		01	19200 bps	
		02	38400 bps	
		03	115200 bps	
Digital Output	60	00 (Initial Setting)	TMDS/YCbCr	Reflected after camera reset
		01	TMDS/RGB	
		02	DVI/RGB	
Monitoring Mode	72	01	1080i/59.94	Reflected after camera reset
		02	1080i/60	
		04	1080i/50	
		06	1080p/29.97	
		07	1080p/30	
		08	1080p/25	
		09	720p/59.94	
		0A	720p/60	
		0B	Reserved	
		0C	720p/50	
		0D	Reserved	
		0E	720p/29.97	
		0F	720p/30	
		10	Reserved	
		11	720p/25	
		12	Reserved	
		13	1080p/59.94	
		14	1080p/50	
		15	1080p/60	
		1B	480p/59.94 (Test Mode)	
		1C	576p/50 (Test Mode)	
		1D	2160p/29.97	
		1E	2160p/25	
		25	2160p/60	
		26	2160p/59.94	
		27	2160p/50	
		28 (Initial Setting)	2160p/30	
Zoom Limit	50	00-FF (Initial Setting: 00)	Wide Limit (0: Disabled)	Reflected after camera reset
	51	00-FF (Initial Setting: 00)	Tele Limit (0: Disabled)	
D-Zoom Max	52	00-EB (Initial Setting: EB)	Max. digital zoom ratio = 256 ÷ (256 – Value)	Reflected after camera reset
Focus Tracking @ZoomDirect	54	00	Off	Reflected after camera reset
		01 (Initial Setting)	On	

Register name	Register No.	Setting value		Setting value reflection timing*1
Focus Offset @DomeCover	55	00-FF (Initial Setting: 00)	00: None to FF: Max.	Reflected after camera reset
AE Parameter Change During VE On, Defog On	58	00	Off	Immediate reflection
		01 (Initial Setting)	On	
Auto Slow Shutter Limit	59	01	1/30	Immediate reflection
		02	1/15	
		03	1/8	
		04 (Initial Setting)	1/4	
		05	1/2	
		06	1/1	
Extended Normal Shutter	5A	00 (Initial Setting)	Off	Immediate reflection
		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	5B	00-FF (Initial Setting: 55)	Defog level Low Limit	Immediate reflection
	5C	00-FF (Initial Setting: AA)	Defog level Mid Limit	
	5D	00-FF (Initial Setting: FF)	Defog level High Limit	
Extended Mode	5F	00 (Initial Setting)	Off	Immediate reflection
		bit: 0 Exposure compensation Extended 256 steps On/Off bit: 1 Aperture Extended 256 steps On/Off bit: 2 Color Gain/Hue Extended 256 steps On/Off bit: 3 Auto ICR Off ⟶ On setting enable On/Off * For each bit, 1 is On and 0 is Off		
Spot Light Avoidance	20	00 (Initial Setting)	Off	Immediate reflection
		01	On	
Optical axis gap compensation	47	00 (Initial Setting)	Off	Reflected after camera reset
		01	On	

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Register name	Register No.	Setting value			Setting value reflection timing[*1]
		Setting value	59.94/29.97 mode	50/25 mode	
Maximum Shutter Limit	4B	0B	1/250	1/215	Immediate reflection
		0C	1/350	1/300	
		0D	1/500	1/425	
		0E	1/725	1/600	
		0F	1/1000	1/1000	
		10	1/1500	1/1250	
		11	1/2000	1/1750	
		12	1/3000	1/2500	
		13	1/4000	1/3500	
		14	1/6000	1/6000	
		15 (Initial Setting)	1/10000	1/10000	

Register name	Register No.	Setting value		Setting value reflection timing[*1]
Far Limit	65	00 (Initial Setting)	Off	Immediate reflection
		01	On	
Far Limit Position	66	10 (Initial Setting)	Over Inf	Immediate reflection
		20	10 m	
		30	5 m	
		40	2.4 m	
		50	1.2 m	
EIS Roll setting	6E	00 (Initial Setting)	On	Immediate reflection
		01	Off	

*1: Timing to reflect register setting value changes

- Reflected after camera reset: After the setting value is changed, changes are reflected following camera reset by "Camera reset command" or "Camera power supply turned Off and then On again".
- Immediate reflection: Changes are reflected immediately after the setting value is changed.

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Specifications

Imager	1/2.8 Type STARVIS CMOS Sensor
Picture elements	Approx. 8390K pixels
Lens	f = 4.0 mm (WIDE) to 40.0 mm
(Typical value)	(TELE), F1.8 to F3.2
Zoom movement speed	
(Reference value)	WIDE – TELE
	T.B.D. sec (Focus Tracking On)
	T.B.D. sec (Focus Tracking Off)
	WIDE – Digital TELE (Digital 12×)
	T.B.D. sec (29.97p/59.94p mode)
	T.B.D. sec (25p/50p mode)
	Digital WIDE – Digital TELE (Digital 12×)
	T.B.D. sec (29.97p/59.94p mode)
	T.B.D. sec (25p/50p mode)
Focus Movement time	
(Reference value)	∞ to Near T.B.D. sec
Zoom	Optical zoom 10×
Digital Zoom	12×
Angle of view (H)	Approx. T.B.D. degrees (Wide end),
(Reference value)	approx. T.B.D. degrees (Tele end)
Min. working distance	
	10 mm (Wide end), 800 mm (Tele end)
Sync system	Internal
Min. illumination	In the case of ICR-Off
(Reference value)	T.B.D. lx (1/30 sec, 50%, High Sensitivity mode On)
	T.B.D. lx (1/30 sec, 50%, High Sensitivity mode Off)
	T.B.D. lx (1/4 sec, 50%, High Sensitivity mode On)
	T.B.D. lx (1/4 sec, 50%, High Sensitivity mode Off)
	In the case of ICR-On
	T.B.D. lx (1/30 sec, 50%, High Sensitivity mode On)
	T.B.D. lx (1/30 sec, 50%, High Sensitivity mode Off)
	T.B.D. lx (1/4 sec, 30%, High Sensitivity mode On)
Image S/N	50 dB (Weight On)
Back light compensation	
	On/Off
Electronic shutter speed	
	1/1 sec to 1/10000 sec (22 steps)
White Balance	Auto, ATW, Indoor, Outdoor, One Push WB, Manual, Outdoor Auto, Sodium Vapor Lamp (Fix/Auto/Outdoor Auto)
Gain	Auto/Manual
	(0 to 50.0 dB (0 to 28 step))
	Max. Gain Limit
	(10.7 to 50.0 dB (6 to 28 step))
Wide Dynamic Range Mode	
	On/Off
Noise Reduction	In the case of the 2D/3D combination
	On/Off (level 5 to 1 / Off, 6 steps)
	In the case of the 2D/3D independent setting
	2D: Level 7 to 1/Off, 8 steps
	3D: Level 5 to 1/Off, 6 steps
Defog	On/Off (Low, Mid, High)
Aperture control	16 steps
Preset	256-POSITIONS
Camera control IF	
	VISCA protocol (CMOS 3.3 V level, 5.5 V tolerant)
	9.6 kbps, 19.2 kbps, 38.4 kbps, 115.2 kbps, Stop bit, 1 bit
Video Output	Digital (TMDS)
Storage temperature/Humidity	
	–20 °C to +60 °C (–4 °F to +140 °F)/ 20% to 95%
	Absolute humidity: 36 g/m^3
Operating temperature/Humidity	
	–5 °C to +45 °C (23 °F to 113 °F)/ 20% to 80%
	Absolute humidity: 36 g/m^3
Power requirements	
	7 V to 12 V DC
Power consumption	
	T.B.D. W (7.0 W under excessive load*)
Mass	Approx. T.B.D. g (xxx lb xxx oz)
Dimensions	50 × 58 × 80 mm
	(2 × 2 3/8 × 3 1/4 in.) (w/h/d)

* Monitoring Mode: 2160p/60, Wide-D Off, VE Off, Image Stabilizer On, AE Full Auto, Auto Focus, zoom lens is in motion

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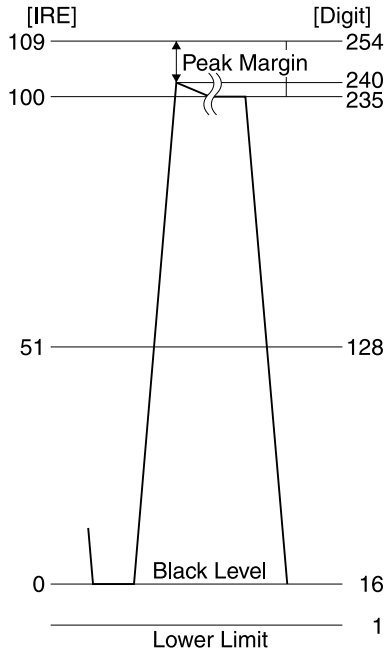
DIGITAL Image Output

Y, Cb, Cr 4:2:2 FORMAT
R, G, B 8:8:8 FORMAT

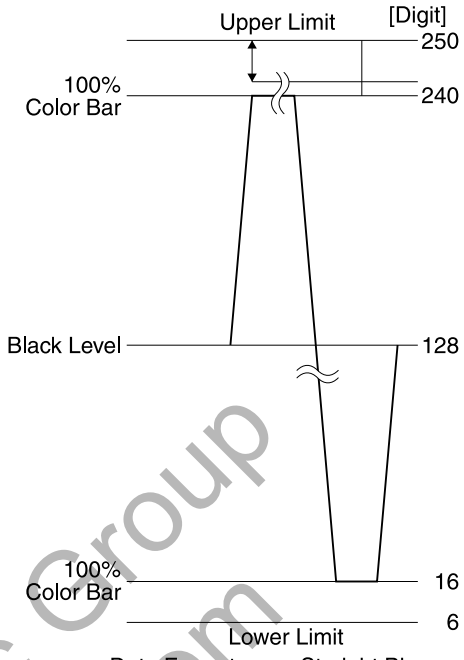
Color coding complies with BT709.

R, G, B, Y-Signal



Data Format : Straight Binary
Black Level : 16 (10h)
100IRE : 235
Prohibited Data : 0,255 (0h,FFh)

Cb, Cr-Signal



Data Format : Straight Binary
Black Level : 128 (80h)
Prohibited Data : 0,255 (0h,FFh)

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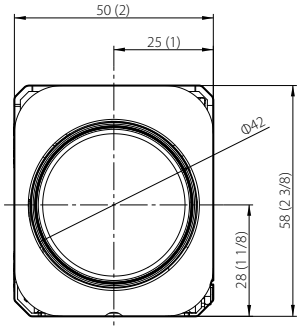
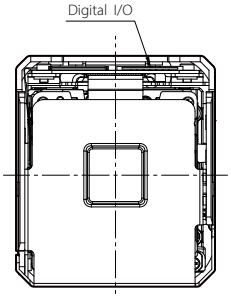
Dimensions

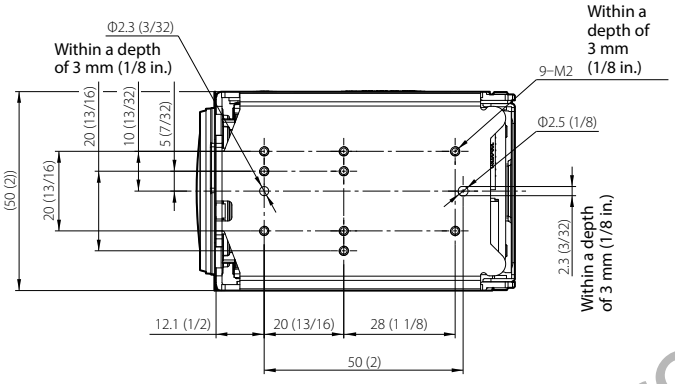
Front



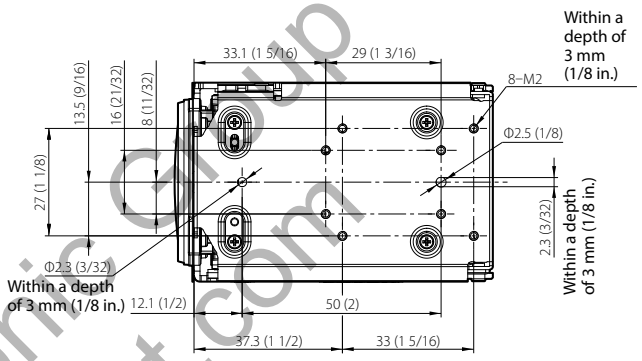
Back



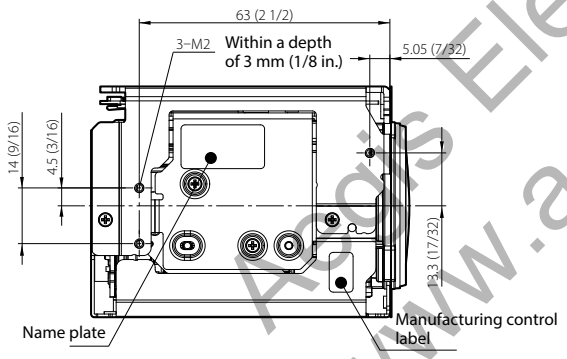
Top



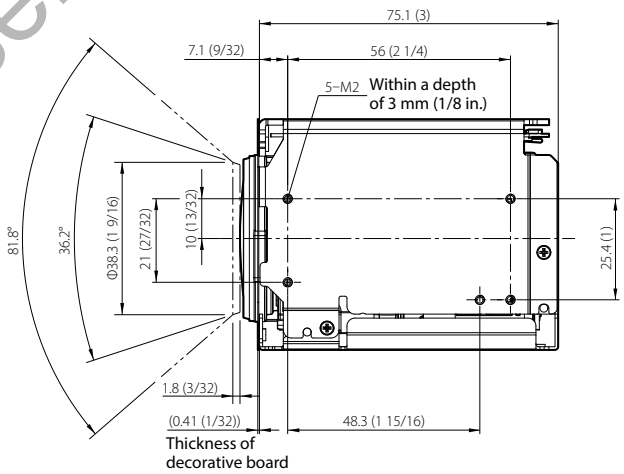
Bottom



Left side

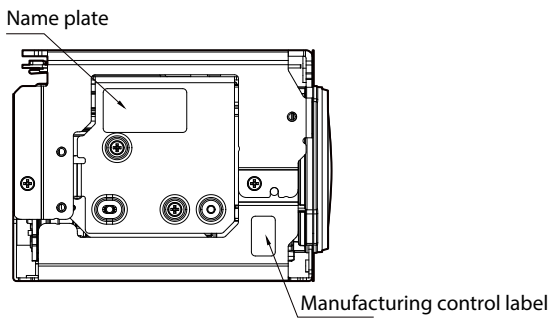


Right side



Unit: mm (inches)

Label drawings



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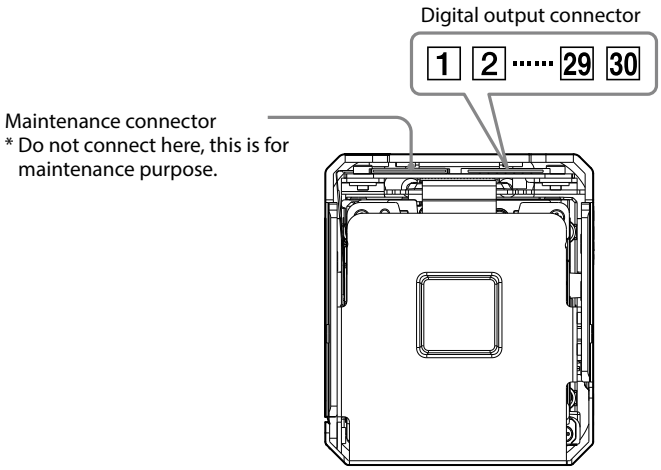
Pin assignment



Note

When directly connecting the TMDS output of the camera to a monitor or other device, control signal processing is required.

Digital output connector

KEL Co. USL00-30L-C

Pin No.	Name	[I/O]: Note
1	GND	
2	HD_CN	[O]: TMDS Clock –
3	HD_CP	[O]: TMDS Clock +
4	GND	
5	HD_0N	[O]: TMDS Data 0 –
6	HD_0P	[O]: TMDS Data 0 +
7	GND	
8	HD_1N	[O]: TMDS Data 1 –
9	HD_1P	[O]: TMDS Data 1 +
10	GND	
11	HD_2N	[O]: TMDS Data 2 –
12	HD_2P	[O]: TMDS Data 2 +
13	GND	
14	NC	
15	NC	
16	NC	
17	NC	
18	NC	
19	NC	
20	NC	
21	NC	
22	NC	
23	NC	
24	VISCA RXD	[I]: CMOS 3.3[V] (Low: Max 1.0[V], High: Min 2.3[V]), 5.5V tolerant
25	VISCA TXD	[O]: CMOS 3.3[V] (Low: Max 0.1[V], High: Min 2.4[V])
26	RESET	[I]: Reset LOW (GND), Reset release: OPEN (High Impedance)
27	DC IN	[I]: 7 to 12[V] DC
28	DC IN	[I]: 7 to 12[V] DC
29	DC IN	[I]: 7 to 12[V] DC
30	DC IN	[I]: 7 to 12[V] DC

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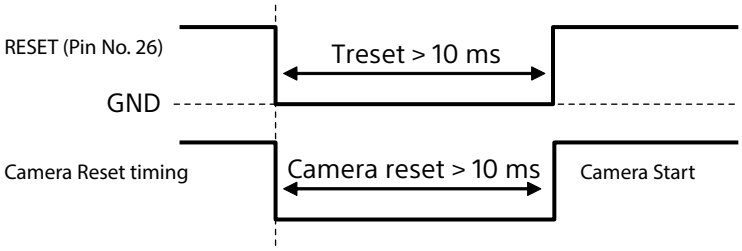
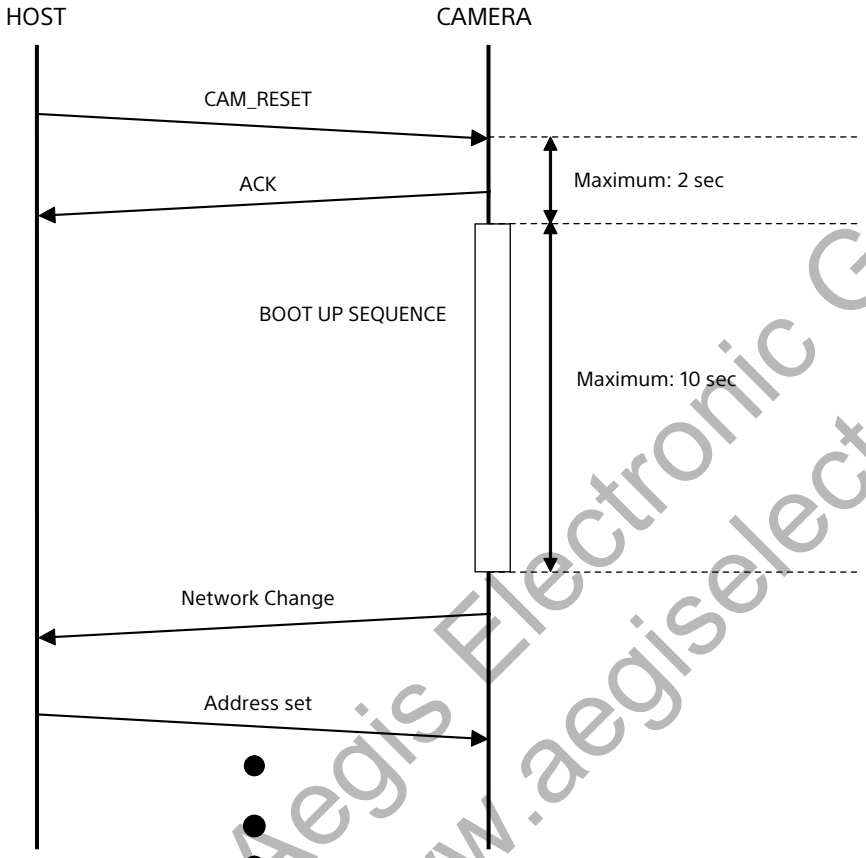
Reset Timing Specification

Low level (GND) pulse (whose width is 10 ms or more) resets this camera.



Reset by VISCA command

The time required from the end of camera reset to the issue of Network Change is as shown below.



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