



# ***Two-channel camera module***

***model Camera 10.100***

**Technical Manual**



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# Features

- **Imager**

This camera uses a 1/2.8" CMOS image sensor (approx. 2.13 million effective pixels) that supports FULL HD (high definition) to produce high quality images and a Thermal channel of LWIR (Long-Wave Infrared) type.

- **ISP**

Using the image signal processor (ISP), the following images can be obtained.

- Full HD 60fps output image,
- Low focal plane distortion image using the high-speed readout of imager.

- **Lens**

The camera is equipped with a bright lens with a F1.6 aperture.

With consideration given environmental protection, this module is designed to operate with low power consumption and also incorporates lead-free and halogen-free circuit boards.

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## Software

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

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## Operation

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

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## Operation and storage locations

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

- Extremely hot or cold places (operating temperature -40 °C to +60 °C)
- Close to generators of powerful electromagnetic radiation such as radio or TV transmitters
- Where it is subject to fluorescent light reflections
- Where it is subject to unstable (flickering, etc.) lighting conditions
- Where it is subject to strong vibration
- Where it is subject to radiation from laser beams

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## Care of the unit

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

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## 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 included in this camera may break if exposed to static electricity. When directly handling this camera, wear an antistatic strap, spread a conductive sheet or similar item under your workbench, and take measures to eliminate static electricity.

# Precautions

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

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## 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.

### White flecks

Although the CMOS image sensors are produced with high-precision technologies, fine white flecks may be generated on the screen in rare cases, caused by cosmic rays, etc.

This is related to the principle of CMOS image sensors and is not a malfunction.

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

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

### Aliasing

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

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## 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.

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## Notification

Please read the contents of description below at least once.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

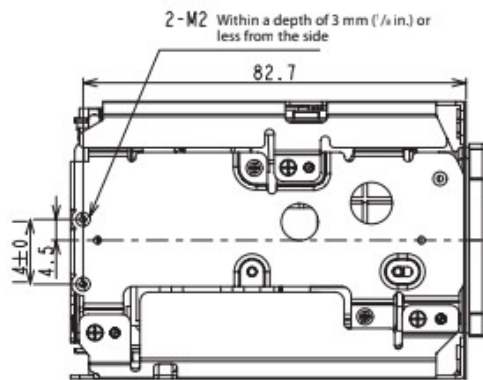
1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. Neither the name of the copyright holder nor the names of contributors may be used to endorse or promote products derived from this software without specific prior written permission.

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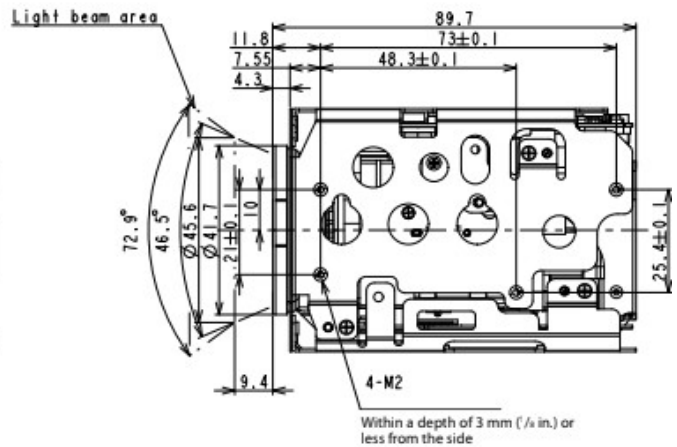
Locations of Controls

# Locations of Controls

Left side



Right side



Unit: mm (inches)

CN401 connector

CN501 connector

, Tripod screw hole

When a tripod is used, please use 7 mm (9/32 in.) or less screw to attach it to the camera.  
Also, please be sure to attach the tripod securely.

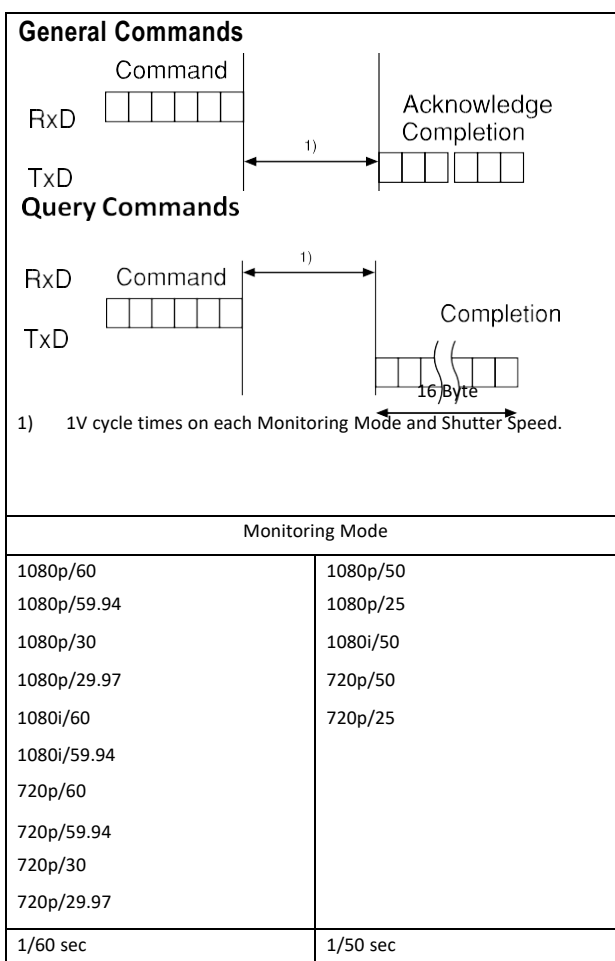
# Basic Functions

## Overview of Functions

The camera control is performed by VISCA Commands.

### Timing Chart

As VISCA Command processing can only be carried out one time in a Vertical cycle, it takes the maximum 1V cycle time for an Acknowledge/Completion to be returned. If the Command/Acknowledge/Completion communication time can be less than the 1V cycle time, then every 1V cycle can receive a Command.



### In general

#### • Power On/Off

Powers the camera on and off.

When the power is off, the camera is able to accept the VISCA Commands although the screen is set non-displayed.

#### • I/F Clear

Clears the Command buffer of the FCB camera.

#### • Address Set

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 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.

#### • ID Write Sets the camera ID.

#### • Mute

Blanks the screen and sends out a synchronizing signal.

#### • Lens Initialize

Initializes the zoom and focus of the lens. Even when power is turned on, it initializes the zoom and the focus.

## Focus

Focus has the following modes.

### • Auto Focus Mode

The minimum focus distance is 10 mm at the optical wide end and 1200 mm at the optical tele end, and is independent of the digital zoom.

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

#### - Normal AF Mode

This is the normal mode for AF operations.

#### - Interval AF Mode

The mode used for AF movements carried out at particular intervals. The time intervals for AF movements and for the timing of the stops can be set in one-second increments using the Set Time Command. The initial setting for both is set to 5 seconds.

#### - Zoom Trigger Mode

When zoom position is changed, it becomes AF mode during the pre-set value (initial setting is set to 5 seconds). Then it stops.

### • One Push Trigger Mode

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

### • Near Limit

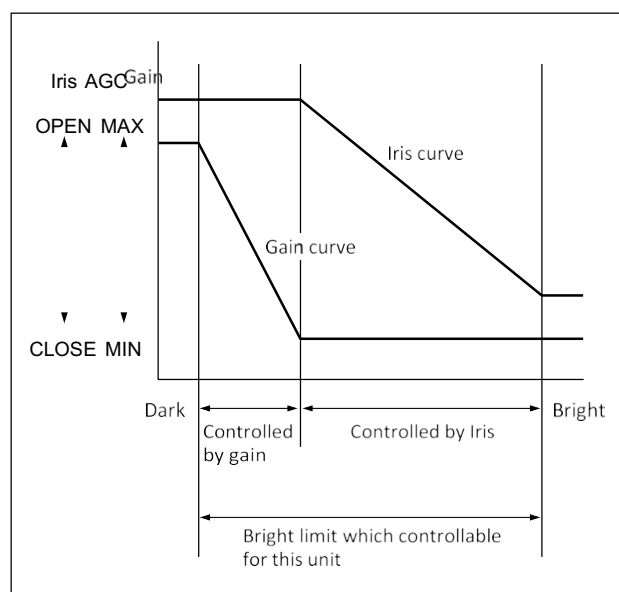
Can be set in a range from 1000 (00) to F000 (10 mm).

Initial setting: D000h (30 cm)

### AE - Bright

The bright control function adjusts both gain and iris using an internal algorithm, according to a brightness level freely set by the user. Exposure is controlled by gain when dark, and by iris when bright. As both gain and iris are fixed, this mode is used when exposing at a fixed camera sensitivity. When switching from Full Auto or Shutter Priority Mode to Bright Mode, the current status will be retained for a short period of time.

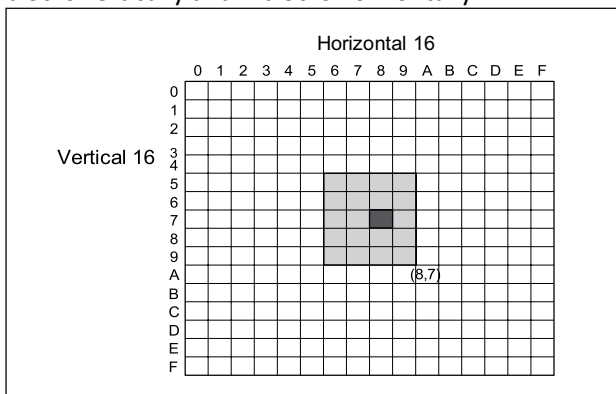
Only when the AE mode is set to "Full Auto" or "Shutter Priority," can you switch it to "Bright."





### Spot Exposure Mode

In Full Auto AE, the level for the entire screen is computed and the optimum Auto Iris and Gain levels are determined. In Spot AE, a particular section of the subject can be designated, and then that portion of the image can be weighted and a value computed so that 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. As shown in the diagram below, a range of 16 blocks vertically and 16 blocks horizontally can be designated. In the case where the center is designated (shown in black), the level is computed along with a weighted value for the surrounding block (shaded), including the specified portions; and then the Gain and Iris are set. The value of the designated portions and the surrounding areas should be calculated as 100%, the rest should be set to 20%. The range of the Spot AE frame is fixed to 5 blocks vertically and 4 blocks horizontally.



### Exposure Compensation

Exposure compensation is a function which offsets the internal reference brightness level used in the AE mode, by steps of 1.5 dB.

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 (Auto Exposure)

The slow AE Response function allows you to reduce the exposure response speed. Usually the camera is set up so that the optimum exposure can be obtained automatically within about 1 second. However, using the slow AE response function allows you to lengthen the auto exposure response speed from the initial setup speed (01h) to approx. 10 minutes (30h) (at normal shutter speed). 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 function means the AE response speed will be slower, and response time will be longer. As a result, even if the camera catches a high-intensity subject (e.g., the headlights) for a moment, you can still easily distinguish the portions of the image surrounding the headlights.

### High Resolution Mode

This mode enhances edges and produces higher definition images.

### Aperture Control

Aperture control is a function which adjusts the edge enhancement of objects in the picture. There are 16 levels of adjustment, starting from "no enhancement." When shooting text, this control may help by making them sharper.

### Backlight Compensation

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

### Visibility Enhancer (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.

### Defog mode

When the surrounding area of the subject is foggy and low contrast, the defog mode will make the subject appear clearer.

You can select this function from the four levels: OFF, Low

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### **Auto Slow Shutter On/Off**

When set to "On," the slow shutter functions automatically when the light darkens. This setting is available only when the AE mode is set to "Full Auto." The initial setting is "Auto Slow Shutter Off."

### **Low-Illumination Chroma Suppress Mode**

You can configure a chroma suppress mode for low illumination conditions. This can be useful when color noise is particularly noticeable in such conditions. Four levels (disabled and three levels) are available for the low-illumination chroma suppress mode.

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### **ICR (IR Cut-Removable) Mode**

An infrared (IR) Cut-Filter can be disengaged from the image path for increased sensitivity in low light environments. The ICR will automatically engage depending on the ambient light, allowing the camera to be effective in day/night environments. When the auto ICR mode is set to On, the image becomes black and white.

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### **Custom Color Gain**

You can configure the color gain. Use this setting when bright color is particularly important. The initial setting 100% (4h) can be set to range from approx. 60% (0h) to 200% (Eh) with 15 stages.

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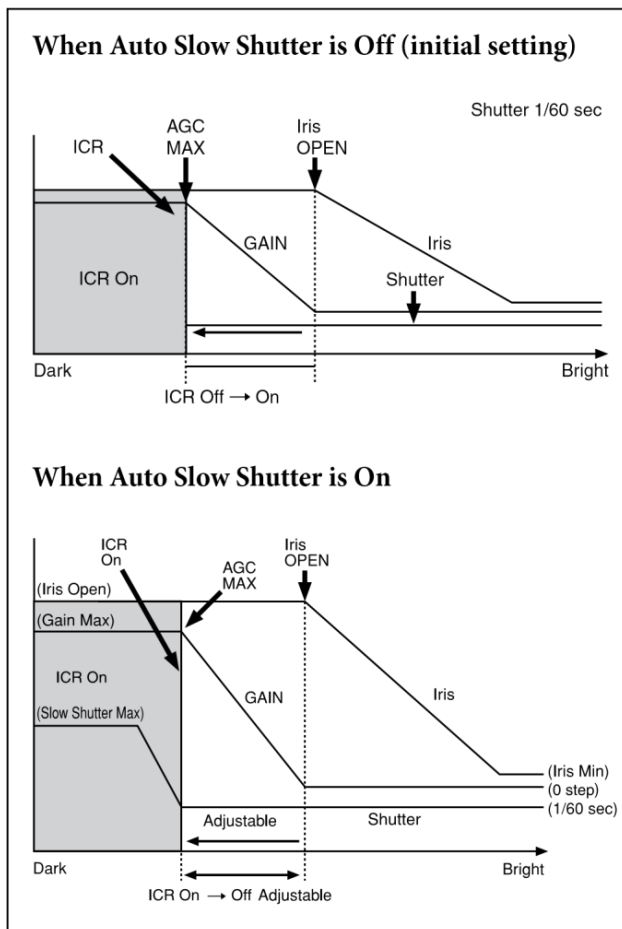
### **Custom Color Phase**

You can configure the color phase. The initial setting 0 degrees (7h) is adjustable between approx. -14 degrees (0h) to +14 degrees (Eh), in 15 increments.

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### **Auto ICR Mode**

Auto ICR Mode automatically switches the settings needed for attaching or removing the IR Cut Filter. With a set level of darkness, the IR Cut Filter is automatically disabled (ICR On), and the infrared sensitivity is increased. With a set level of brightness, the IR Cut Filter is automatically enabled (ICR Off). Also, on systems equipped with an IR light, the internal data of the camera is used to make the proper decisions to avoid malfunctions. Auto ICR Mode operates with the AE Full Auto setting.



**Note**

Depending on the information such as brightness, etc., in the On/Off settings condition, a malfunction may occur when the subjects largely consisting of blue and green colors are taken.

**Camera ID**

The ID can be set up to 65,536 (0000h to FFFFh). As this will be memorized in the nonvolatile memory inside, data will be saved.

**Picture Effect**

It consists of the following functions.

- **Neg. Art:** Negative/Positive Reversal
- **Black & White:** Monochrome Image

### Register Setting

The camera's initial settings can be changed by the register setting command. Register Setting Command:

8x 01 04 24 mm 0p 0q FF mm:

Register No. (=00 to 7F) pq: 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.

For details, see "Register Setting" on page 55, 56.

Baud Rate: 00

Communication speed can be changed.

Monitoring Mode: 72 The

output mode can be set.

LVDS Mode: 74 LVDS output

mode can be set.

Zoom Limit: 50 (Wide end), 51 (Tele end)

The Wide and Tele zoom limits can be set.

D-Zoom Max: 52

The maximum digital zoom limit can be set (initial setting is 12x).

"StableZoom": 53

ON/OFF can be set. (initial setting is OFF.)

For details, see page 12.

FocusTrace: 54

When you want to prioritize zoom speed, set FocusTrace to Off to minimize the transition time between Wide and Tele zoom (although the image may be blurred because focus is not tracked).

FocusOffset: 55

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 exceeds the AF range, so focus cannot track, although it responds to changes in this value.

*For details, see "Register Setting" on page 56.*

AE parameter change during VE On, Defog On: 58

ON/OFF can be set. (initial setting is ON.)

Auto slow shutter limit: 59

The auto slow shutter limit can be set. (initial setting is 04.)

*For details, refer to "Register Setting" (page 56).*

Extended normal shutter: 5A

The lower limit of slow shutter when the Auto Slow Shutter mode is set to OFF can be set. (initial setting is OFF.)

Defog Limit: 5B, 5C, 5D

The maximum value of Defog mode in the low, mid and high levels can be set respectively.

Extended mode: 5F

ON/OFF can be set. (initial setting is OFF.) For details, see page 21.

#### Note

After changing the register setting, turn off the camera, then turn it on again.

**Privacy Zone Masking Settings** For details, see page 17.

### Motion detection

For details, see page 19.

## Extended Commands

Extended commands support the following functions (described previously). Turn on this mode (for details, see "Extended Mode" in "Register Setting" on page 56) to enable the following functions.

- **Exposure Compensation**

The setting can be set in steps of approximately 0.2dB (-128 (00h) to approximately +127 (FFh)). *For details, see page 11.*

- **Aperture Control**

The setting can be set to 256 levels (00h to FFh). *For details, see page 11.*

- **Custom Color Gain**

The initial setting is 100% (80h), and the setting can

be set to 256 levels from approximately 0% (00h) to approximately 200% (FFh). *For details, see page 13.*

- **Custom Color Phase**

The initial setting is 0 degrees (80h), and the setting can be set to 256 levels from approximately -14 degrees (00h) to approximately +14 degrees (FFh). *For details, see page 13.*

- **Auto ICR Mode**

The setting of ICR ON→OFF threshold can be  $\alpha$  when Auto ICR is on.

The setting range is 0 step (00h) to 255 step (FFh).

The setting of ICR OFF→ON threshold (On Level)  $\alpha$  be set when Auto ICR is on.

The setting range is 0 step (00h) to 28 step (1Ch).

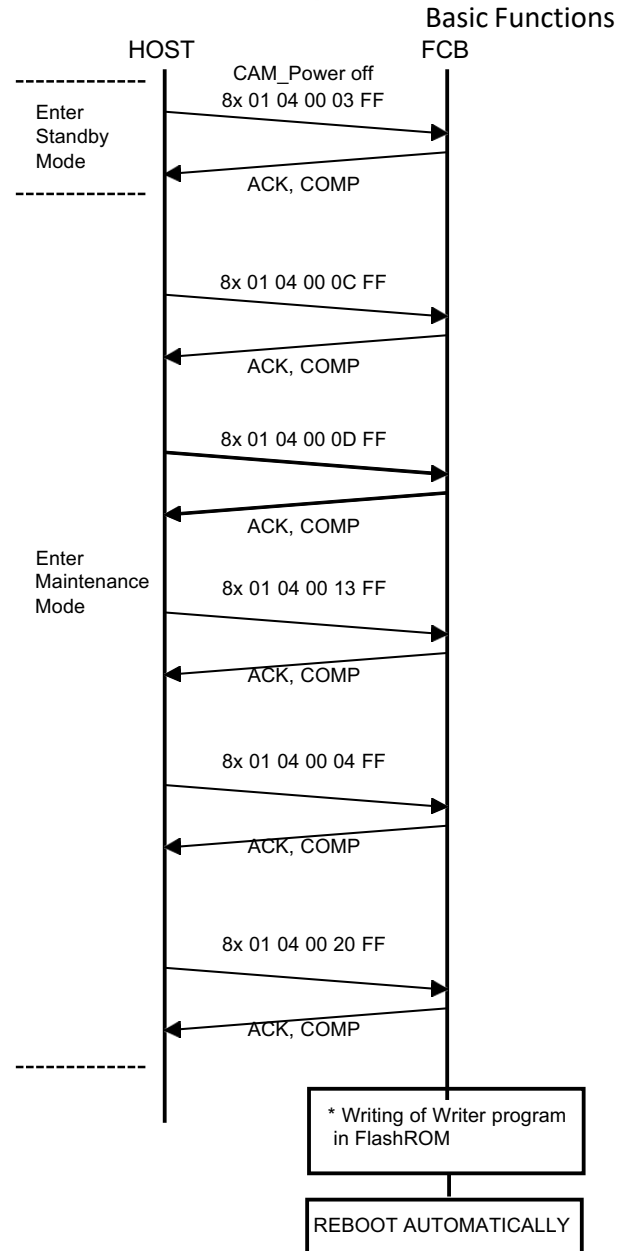
*For details, see page 13.*

**Note**

When the extended mode is Off, CMD\_NOT\_EXEC will be returned if you send the extended commands to the camera.

When the extended mode is On, CMD\_NOT\_EXEC will

be returned if you send the normal commands to the camera. \*



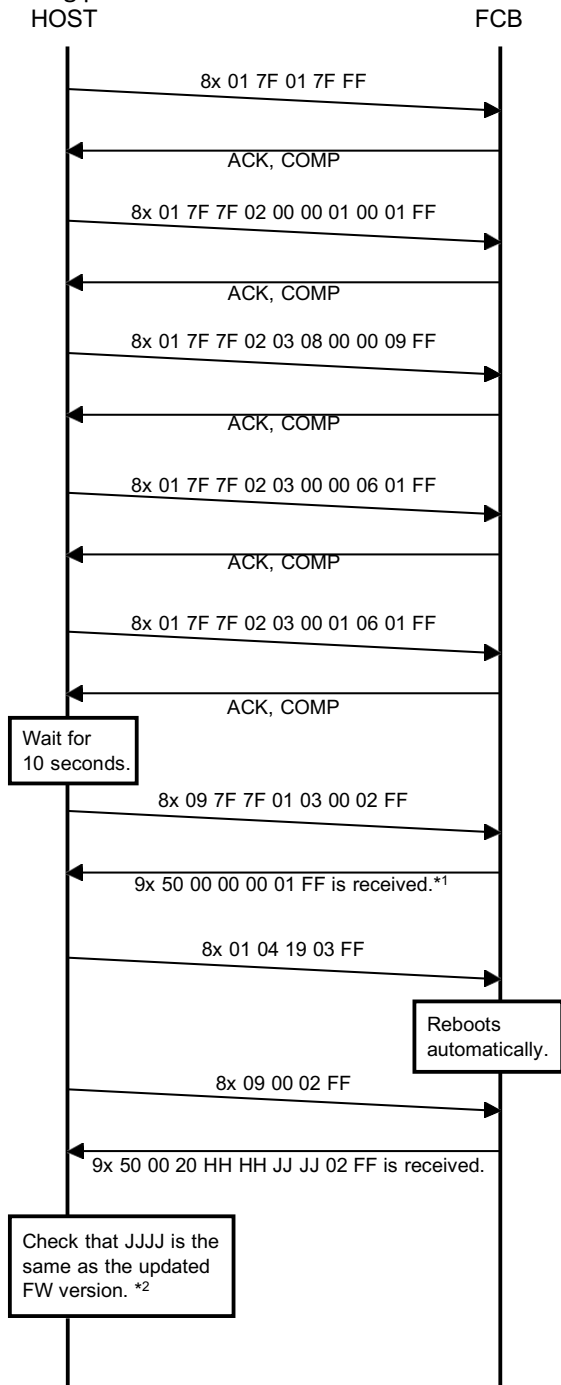
When power is off during this period, camera will be broken.

## Maintenance Mode

\* When power is off during this period, camera will be broken.

## Finalizing procedure

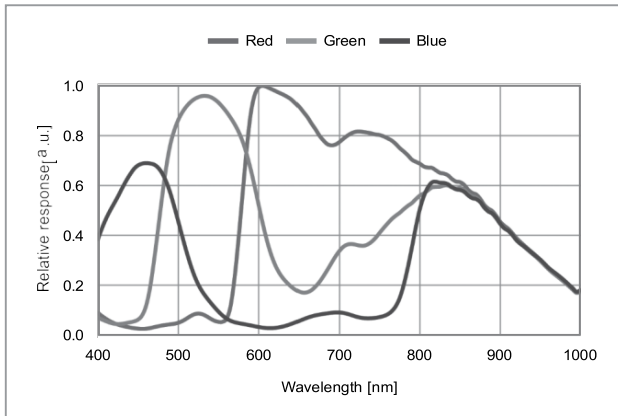
After the maintenance mode, perform the following finalizing procedure.



\*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.

## 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.

# VISCA/RS-232C Commands

This Manual outlines an RS-232C control protocol and command list for certain VERACITAS cameras from which control software can be developed. THIS CONTROL PROTOCOL AND COMMAND LIST IS PROVIDED BY VERACITAS ON AN "AS-IS BASIS" WITHOUT WARRANTY OF ANY KIND. VERACITAS 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, VERACITAS 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 VERACITAS 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.

# Command List

## Overview of VISCA

In VISCA, the device outputting commands, for example, a computer, is called the controller. The device receiving the commands, an FCB camera is called the peripheral device. In VISCA, up to seven peripheral devices like the FCB 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.

## 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 FCB 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

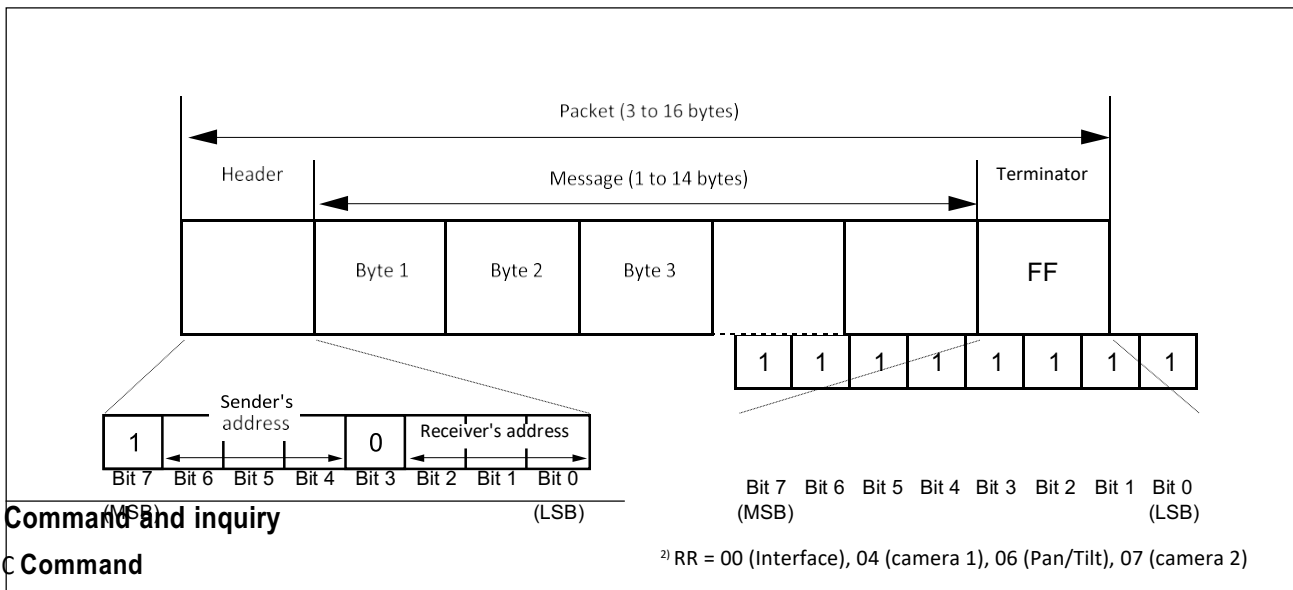


of the camera at X. The header of the reply packet from the camera assigned address 1 is 90h. The packet from the camera assigned address 2 is A0h. Some of the commands for setting cameras can be sent to all devices at one time (broadcast). In the case of broadcast, the header should be hexadecimal 88h. When the terminator is FFh, it signifies the end of the packet.

Sends operational commands to the FCB camera.  
**C Inquiry**  
 Used for inquiring about the current state of the FCB camera.

	Command Packet	Note
Inquiry	8X QQ RR ... FF	QQ <sup>2)</sup> = Command/Inquiry, RR <sup>2)</sup> = category code

<sup>1)</sup> QQ = 01 (Command), 09 (Inquiry)



### Responses for commands and inquiries

X = 1 to 7: FCB camera address

#### C Acknowledge message

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

#### C Completion message

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

Acknowledge message is omitted, the socket number will contain 0.

	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

### C 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 6Y 01 FF	Message length error (>14 bytes)
X0 6Y 02 FF	Syntax Error
X0 6Y 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

cancel one of any two commands which have been sent, use the cancel message.

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

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

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

### Socket number

When command messages are sent to the FCB camera, send the next command message after waiting for the completion message or error message to return. However to deal with advanced uses, the FCB camera has two buffers (memories) for commands, so that up to two commands including the commands currently being executed can be received. When the FCB 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, an FCB camera management command and some inquiry messages can be executed.

The Acknowledge message is not returned for these commands and inquiries, and only the completion message of socket number 0 is returned.

### Command execution cancel

To cancel a command which has already been sent, send the Cancel command as the next command. To



## VISCA Device Setting Command

Before starting control of the FCB camera, be sure to send the Address command and the IF\_Clear command using the broadcast function.

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### For VISCA network administration

#### C Address

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

#### C Network Change

Sent from the peripheral device to the controller when a device is removed from or added to the network. The address must be re-set when this message is received.

	Packet	Note
Address	88 30 01 FF	Always broadcasted.
Network Change	X0 38 FF	
X = 9 to F: FCB camera address + 8		

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### VISCA interface command

#### C IF\_Clear

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

	Command Packet	Reply Packet	Note
IF_Clear	8X 01 00 01 FF	X0 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)			
X = 9 to F: FCB camera board address +8 (For reply packet)			

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### VISCA interface and inquiry

#### C 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: VERACITAS)
	HHHH = Model ID		
046F: FCB-EV7520	xxxx: FCB-CV7520		
	JJJJ = ROM revision		
	KK = Maximum socket #(02)		

X = 1 to 7: FCB camera address (For inquiry packet)  
X = 9 to F: FCB camera address +8 (For reply packet)

## VISCA Command/Acknowledge Protocol

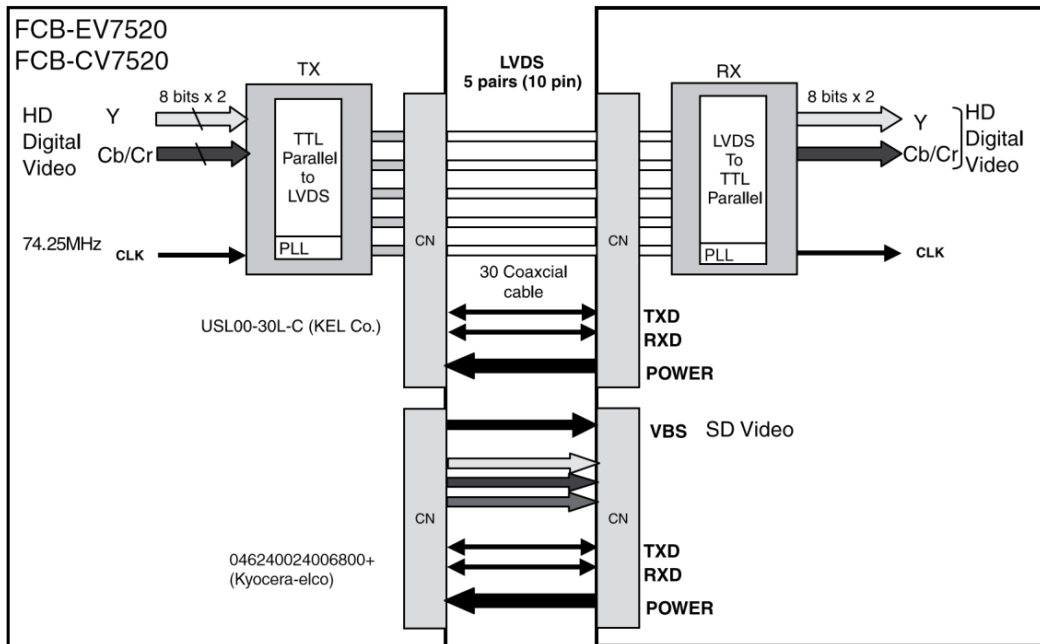
Command	Command Message	Reply Message	Comments
General Command	81 01 04 38 02 FF (Example)	90 41 FF (Acknowledge) +90 51 FF (Completion) 90 42 FF 90 52 FF _ _	Returns Acknowledge when a command has been accepted, and Completion when a command has been executed.
	81 01 04 38 FF (Example)	90 60 02 FF (Syntax 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 <u>02</u> 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 <u>01</u> FF	88 30 <u>02</u> 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 Canceled)	Returned when the command of the socket specified is canceled. Completion for the command canceled is not returned.
		z0 6y 05 FF (No Socket)	Returned when the command of the specified socket has already been completed or when the socket number specified is wrong.

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

# Specifications

Imager	1/2.8 Type "Exmor R" CMOS Sensor	Recommended illumination	100 lx to 100,000 lx
Picture elements	2130K pixels	S/N ratio	50 dB (Weight On)
Lens	30x Zoom F= 4.3 mm (WIDE) to 129 mm (TELE), F1.6 to F4.7	Back light compensation	On/Off Electronic shutter
	Zoom movement speed	speed	1/1 sec to 1/10000 sec (22 steps)
	Optical WIDE - Optical TELE	White Balance	Auto, ATW, Indoor, Outdoor, One Push WB, Manual WB, Outdoor Auto, Sodium Vapor Lamp (Fix/Auto/Outdoor Auto)
	4.6 sec (Focus Tracking On)	Gain	Auto/Manual
	3.2 sec (Focus Tracking Off)		(0 to 50.0 dB (0 to 28 step))
	Optical WIDE - Digital TELE		Max. Gain Limit
	6.7 sec (29.97p/59.94p mode)		(10.7 to 50.0 dB (6 to 28 step))
	7.1 sec (25p/50p mode)	Noise Reduction	On/Off (level 5 to 1 / Off, 6 steps)
	Digital WIDE - Digital TELE	Defog mode	On/Off
	2.2 sec (29.97p/59.94p mode)	Color Enhancement	On/Off Aperture control
	2.7 sec (25p/50p mode)		16 steps
	Focus Movement time	Preset	16-POSITIONS
	00 to Near	Camera control	VISCA protocol (CMOS 5V)
	1.1 sec		9.6 kbps, 19.2 kbps, 38.4 kbps, 115.2 kbps, Stop bit, 1 bit
Digital Zoom	12x (360x with optical zoom}	Video Output	HD: Digital (LVDS)
Angle of view (H)	Approx. 63.7 degrees (wide end), approx. 2.3 degrees (tele end)		Analog SD: VBS
Min. working distance	10 mm (wide end), 1200 mm (tele end)	Storage temperature/Humidity	-20 °C to +60 °C (-4 °F to +140 °F)/ 20% to 95%
Sync system	Internal	Operating temperature/Humidity	-5 °C to +60 °C (23 °F to +140 °F)/ 20% to 80%
Min. illumination (Typical value)	In the case of ICR-Off		Absolute humidity: 36 g/m <sup>3</sup>
	0.01 lx (1/30 sec, 50%, High Sensitivity mode On)	Power requirements	6 V to 12 V DC
	0.1 lx (1/30 sec, 50%, High Sensitivity mode Off)	Power consumption	3.2 W
	0.0013 lx (1/4 sec, 1/3 sec, 50%, High Sensitivity mode On)		(during motor operation: 4.0 W)
	0.013 lx (1/4 sec, 1/3 sec, 50%, High Sensitivity mode Off)	Mass	Approx. 255 g (9.0 oz.)
	In the case of ICR-On	Dimensions	50.0 x 60 x 89.7 mm
	0.0015 lx (1/30 sec, 50%, High Sensitivity mode On)		(2 x 2 <sup>3</sup> / <sub>8</sub> x 3 <sup>5</sup> / <sub>8</sub> in.) (w/h/d)
	0.006 lx (1/30 sec, 50%, High Sensitivity mode Off)		
	0.0008 lx (1/4 sec, 1/3 sec, 30%, High Sensitivity mode On)		

## Interface



- In FCB-EV7520/FCB-CV7520, the video signal is transmitted by using LVDS. The LVDS receiver IC chip (e.g., THC63LVD1024, THC63LVD104C, BU90R102) is recommended.
- Recommended connectors and cables  
Cable: #42 thin coaxial cable



Parameter	Parameter value
<b>Camera 10.100</b>	
<b>Thermal imaging channel</b>	
Matrix type	LWIR
Resolution	640 x 512
Angles of view, degrees:	
Horizontal	102 ± 10%
Vertical	72 ± 10%
<b>CMOS channel</b>	
Matrix type	CMOS
Resolution	1920 x 1080
Angles of view, degrees:	
Horizontal	26,3 ± 10%
Vertical	20,2 ± 10%
Inclusion time, no more, s	30
Visibility range, not less than, m:	450
<b>Power</b>	
Supply voltage, V	27
Continuous operation time, not less than, hour	23
Temperature range, C:0	
Operating temperature	- 40 . + 60
Storage temperature	- 45 . + 70
Mass of camera 10.100, kg	1,1
Overall dimensions camera 10.100, mm	90x72x114