SONY

Technical Manual

(Ver. 1.0) ——English——

Table of Contents

OUTLINE

The DFW-SX900/X700 is a C-mounted color digital video camera utilizing a 1/2-type PS IT CCD. The IEEE1394-1995 digital interface realizes a transfer speed of 400M bps and outputs SXGA (1,280 × 960)/YUV (4 : 2 : 2)/7.5 fps with the DFW-SX900, XGA (1,024 × 768)/YUV (4 : 2 : 2)/15 fps with the DFW-X700. In addition, the DFW-SX900/X700 also adopts a primary color filter CCD to realize good color reproductivity, as well as a square pixel CCD to eliminate the need for aspect ratio conversion in the image processor.

MAIN FEATURES

◇ **1/2-type progressive scan IT CCD**

◇ **Primary color filter/square pixel/progressive scan CCD**

◇ **Non-compressed YUV (4 : 2 : 2) 8 bits each**

◇ **External trigger function**
The external trigger shutter function allows the image exposure to be coordinated with external equipment and moving objects. The exposure time can be controlled via software over the IEEE1394 bus.

◇ **Solid aluminum diecast chassis**

◇ **Partial scan/output of images is possible by the partial scan function**

◇ **Electronic pan and tilt of partial scan region**

◇ **C-Mount with Flange-Back adjustment**

◇ **Remote control of camera settings and operation via IEEE-1394 commands**
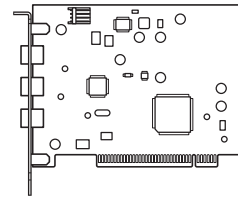
SYSTEM COMPONENTS
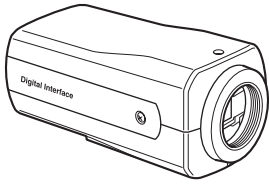
Video Camera Module
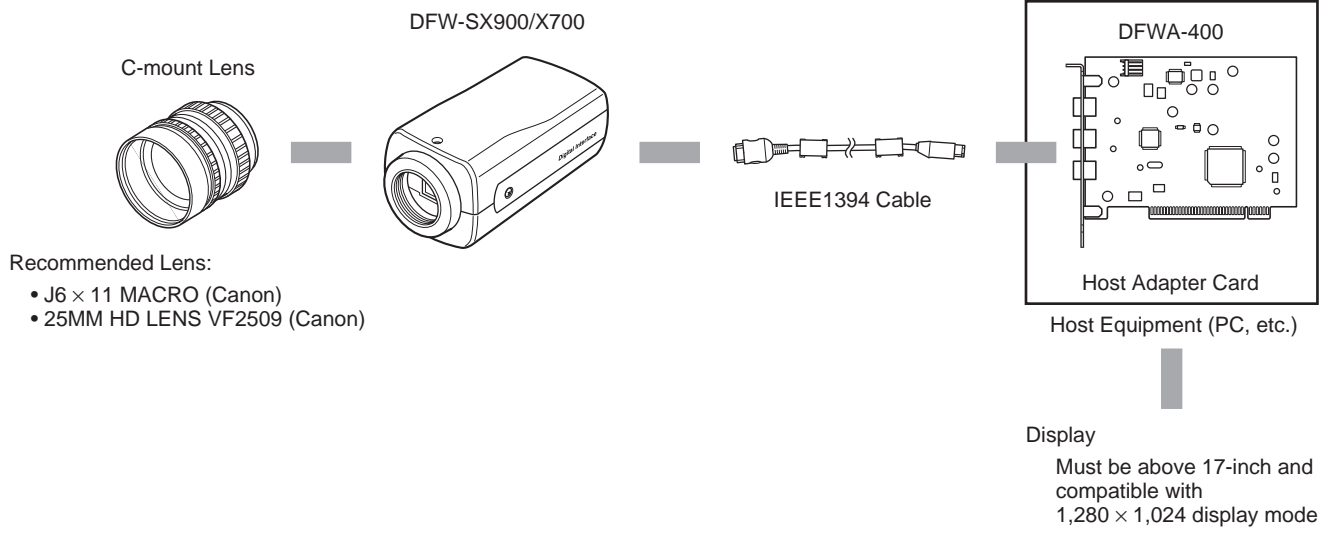DFW-SX900/X700
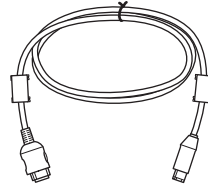
IEEE1394 Cable
(6-pin, 4.5 m)

C-mount Lens (Option)
• J6 × 11 MACRO (Canon)
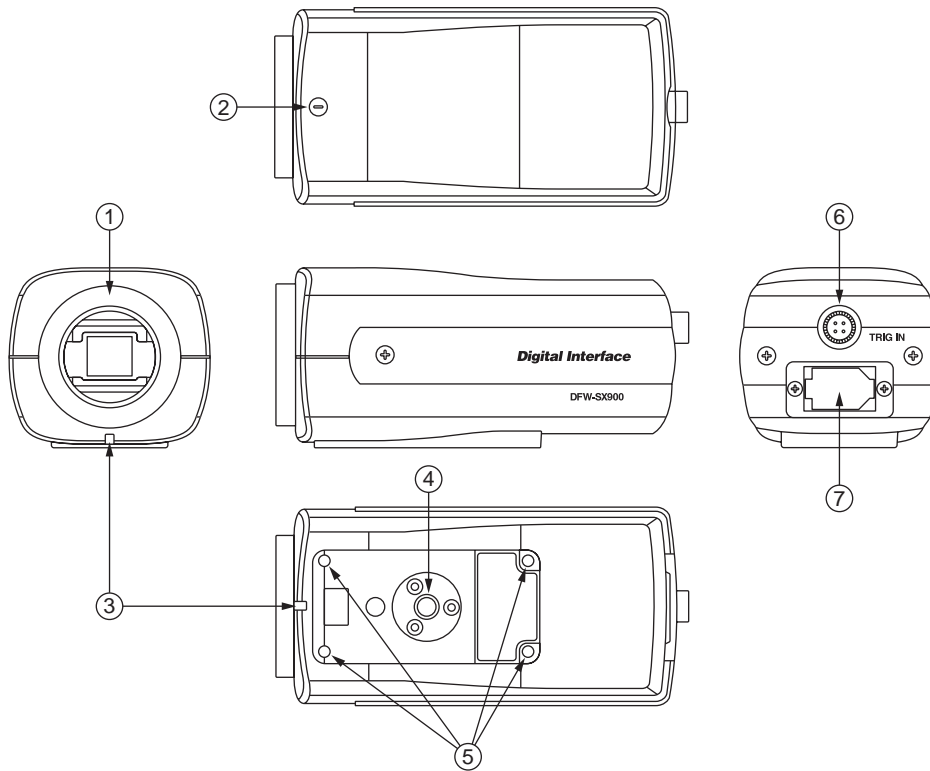• 25MM HD LENS VF2509 (Canon)

Host Adapter Card (Option)
DFWA-400

SPECIFICATIONS

Image sensor	:	1/2-type progressive scan IT CCD
Number of effective pixels		
DFW-SX900	:	Approx. 1.45M pixels 1,392 (H) × 1,040 (V)
DFW-X700	:	Approx. 800K pixels 1,034 (H) × 779 (V)
Output image size (Max.)		
DFW-SX900	:	1,280 (H) × 960 (V)
DFW-X700	:	1,024 (H) × 768 (V)
Interface format	:	IEEE1394-1995
Protocol	:	1394-based Digital Camera Specification Version 1.30
Data format		
DFW-SX900	:	1,280 × 960 YUV (4 : 2 : 2)
		1,024 × 768 YUV (4 : 2 : 2)
		800 × 600 YUV (4 : 2 : 2)
		640 × 480 YUV (4 : 2 : 2)
		320 × 240 YUV (4 : 2 : 2)
DFW-X700	:	1,024 × 768 YUV (4 : 2 : 2)
		800 × 600 YUV (4 : 2 : 2)
		640 × 480 YUV (4 : 2 : 2)
		320 × 240 YUV (4 : 2 : 2)
Frame rate		
DFW-SX900	:	7.5/3.75 fps
DFW-X700	:	15/7.5 fps
Transfer speed	:	400M, 200M bps
Lens mount	:	C-mount
Flange back	:	17.526 mm
Minimum illumination	:	20 lx (F1.4, Gain: +18 dB)
White balance	:	One Push/ATW/Preset (3,200 K, 5,600 K)/Manual
HUE	:	Adjustable
Saturation	:	Adjustable
Brightness	:	Adjustable
Gamma	:	Switchable between three positions including OFF
CCD iris	:	ON/OFF (range DFW-SX900 : 1/7.5 to 1/1,000
		DFW-X700 : 1/15 to 1/1,000)
Shutter	:	2s to 1/20,000s
Gain	:	Auto/Manual (0 to 18 dB)
External trigger shutter	:	Available
Minimum unit in partial scan mode		
DFW-SX900	:	320 (H) × 240 (V)
DFW-X700	:	512 (H) × 192 (V)
Supply voltage	:	DC +8 to +30 V (from IEEE1394 cable)
Power consumption	:	3.3 W (at 12 V)
Operating temperature	:	–5 to +45°C
Storage temperature	:	–20 to +60°C
Operating relative humidity	:	20 to 80% (No condensation)
Storage relative humidity	:	20 to 95% (No condensation)
Dimensions	:	55 (W) × 50 (H) × 110 (D) mm
Mass	:	250 g
Accessories	:	IEEE1394 cable (1), Lens mount cap (1), Clamp filter (2)
		External trigger connector (male) (1), Operating Instructions (1)

CONNECTION

C-mount Lens

DFW-SX900/X700

IEEE1394 Cable

DFWA-400

Host Adapter Card

Host Equipment (PC, etc.)

Recommended Lens:
- J6 × 11 MACRO (Canon)
- 25MM HD LENS VF2509 (Canon)

Display
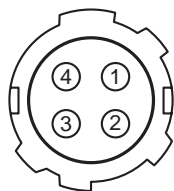Must be above 17-inch and
compatible with
1,280 × 1,024 display mode

NAMES AND FUNCTIONS OF PARTS

① Lens mount (C-mount)

② Flange back hole

Adjust the flange back using a standard head screwdriver.

③ Pilot lamp

Lights green when the power is turned on, and blinks orange in the isochronous transmission (enabled) state.

④ Screw hole for tripod mounting

⑤ Camera fixing reference holes

⑥ TRIG IN (Trigger) connector

Inputs the TTL level, negative polarity trigger signal.

⑦ Camera connector (IEEE1394 connector)

Connect to the host equipment using the IEEE1394 cable provided.

⑥ **Pin assignment of TRIG IN connector (female)**   ⑦ **Pin assignment of camera connector**

1. NC
2. GND
3. TRIG IN
4. NC

1. Power
2. Power (GND)
3. TPB–
4. TPB+
5. TPA–
6. TPA+
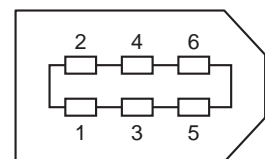
DIMENSIONS

DFW-SX900
DFW-X700

1" -32UNC

50
25.5
55
1

110
5
3.5

Digital Interface

DFW-SX900

TRIG IN
16.55
33.4

41
1/4" -20UNC
25
4-M3 (Effective Depth 5)
13
56
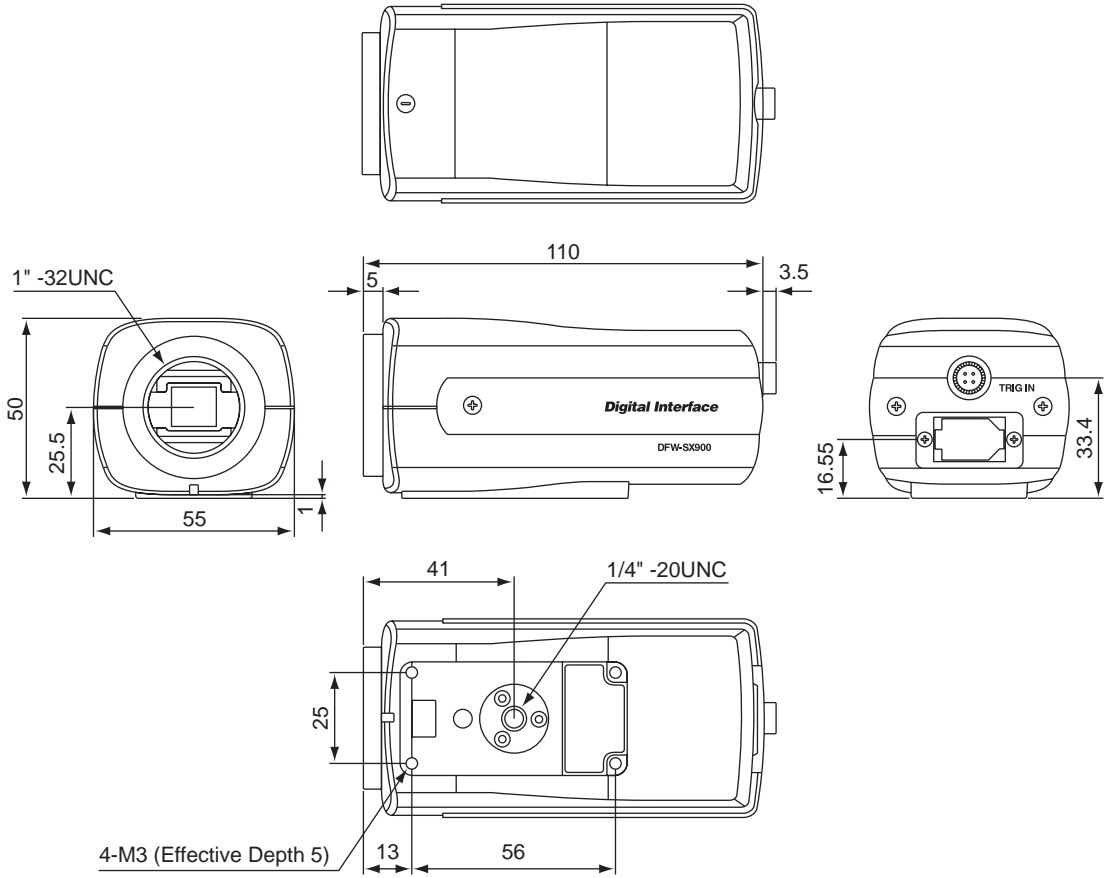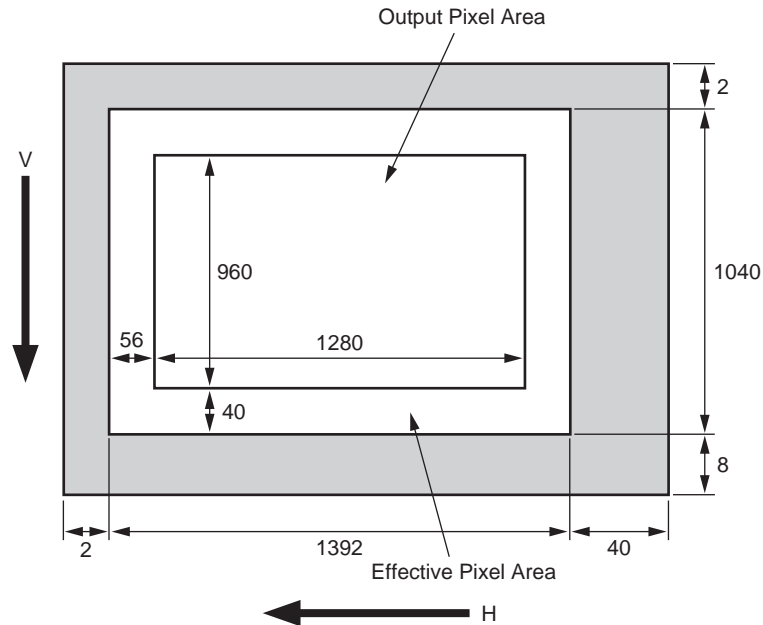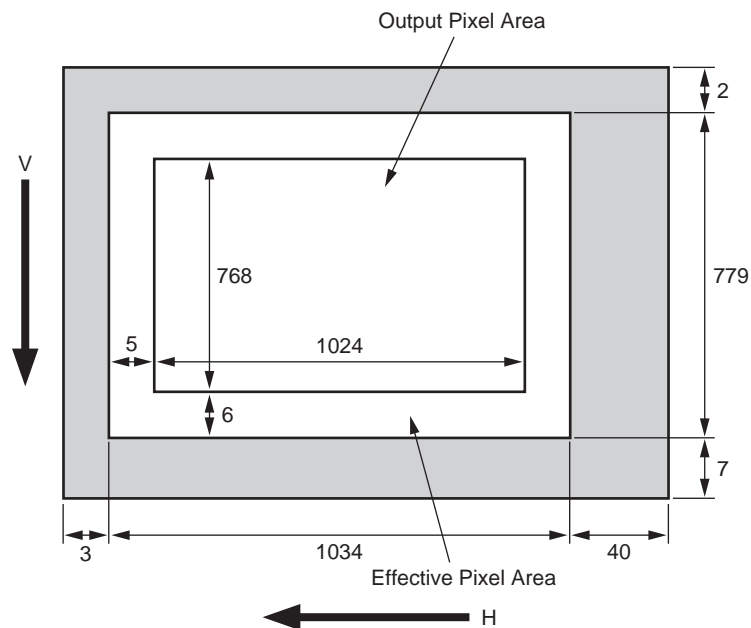
Unit: mm

CCD PIXEL LOCATION

DFW-SX900

Total number of pixels : 1,434 (H) × 1,050 (V)

Number of effective pixels: 1,392 (H) × 1,040 (V)

Number of output pixels : 1,280 (H) × 960 (V)

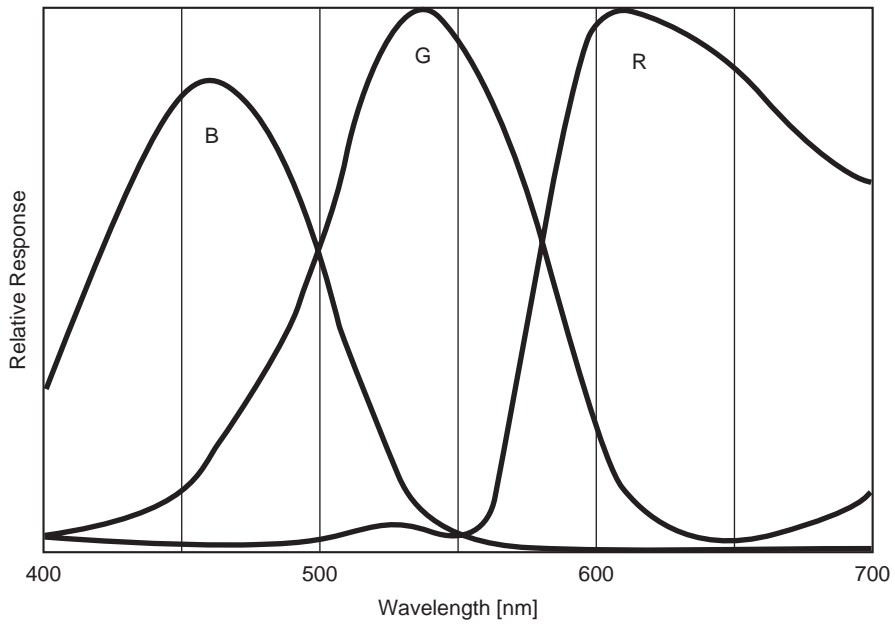Unit cell size : 4.65 μm (H) × 4.65 μm (V)

DFW-X700

Total number of pixels : 1,077 (H) × 788 (V)

Number of effective pixels: 1,034 (H) × 779 (V)

Number of output pixels : 1,024 (H) × 768 (V)
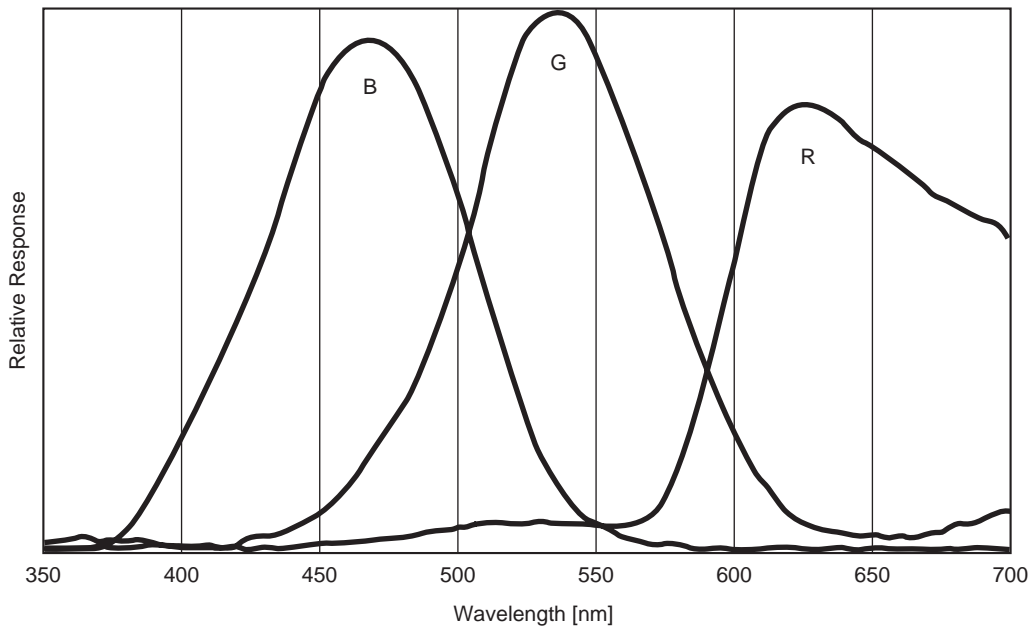
Unit cell size : 6.25 μm (H) × 6.25 μm (V)

SPECTRAL CHARACTERISTICS (TYPICAL VALUES)

Example of spectral characteristics of CCD image sensor used for DFW-SX900

Example of spectral characteristics of CCD image sensor used for DFW-X700

FUNCTIONS

The DFW-SX900/X700 differs from conventional analog cameras in that no video signals will be output by just supplying power. It will start operating when designated commands are written in the CSR (Control & Status Register) specified in the 1394-based Digital Camera Specification Ver.1.30. For details on the steps to video signal output and details of CSR, refer to "SETTINGS OF CAMERA CONTROL AND STATUS REGISTER" on page 20 and "COMMAND SENDING PROCEDURE UNTIL IMAGES ARE DISPLAYED" on page 33.

This chapter describes the functions of the camera which can be set using the CSR.

■ Camera Functions

◇ Video Format

Image sizes supported are as follows.

(X7 indicates the Video Format, Video Mode, and Frame Rate supported by the DFW-X700. S9 indicates the Video Format, Video Mode, and Frame Rate supported by the DFW-SX900.)

Format_0

Mode	Video Format	60 fps	30 fps	15 fps	7.5 fps	3.75 fps
Mode_0	160 × 120　YUV (4 : 4 : 4)					
Mode_1	320 × 240　YUV (4 : 2 : 2)			X7	X7/S9	S9
Mode_2	640 × 480　YUV (4 : 1 : 1)					
Mode_3	640 × 480　YUV (4 : 2 : 2)			X7	X7/S9	S9
Mode_4	640 × 480　RGB					
Mode_5	640 × 480　Y (Mono)					
Mode_6						
Mode_7						

Format_1

Mode	Video Format	60 fps	30 fps	15 fps	7.5 fps	3.75 fps	1.875 fps
Mode_0	800 × 600　　YUV (4 : 2 : 2)			X7	X7/S9	S9	
Mode_1	800 × 600　　RGB						
Mode_2	800 × 600　　Y (Mono)						
Mode_3	1,024 × 768　YUV (4 : 2 : 2)			X7	X7/S9	S9	
Mode_4	1,024 × 768　RGB						
Mode_5	1,024 × 768　Y (Mono)						
Mode_6							
Mode_7							

Format_2

Mode	Video Format	60 fps	30 fps	15 fps	7.5 fps	3.75 fps	1.875 fps
Mode_0	1,280 × 960　　YUV (4 : 2 : 2)				S9	S9	
Mode_1	1,280 × 960　　RGB						
Mode_2	1,280 × 960　　Y (Mono)						
Mode_3	1,600 × 1,200　YUV (4 : 2 : 2)						
Mode_4	1,600 × 1,200　RGB						
Mode_5	1,600 × 1,200　Y (Mono)						
Mode_6							
Mode_7							

═══ **FUNCTIONS** ═══

◇ **Gain**

Used for setting the gain of the video signal amplifier. The gain can be set in 180 steps between the standard gain and maximum +18 dB. (1 step is not 0.1 dB.)

By setting AUTO to ON, the gain will be automatically adjusted to the appropriate exposure. The range of operation is 0 to +18 dB.

◇ **Shutter**

The CCD exposure time can be set between the maximum 2 seconds and minimum 1/20,000 seconds. By setting AUTO to ON, the exposure time will be automatically adjusted to the appropriate exposure.

◇ **Auto Exposure**

Used for setting the exposure compensation when Gain or Shutter or both are operating in the AUTO mode. When both Gain and Shutter are set to Manual, the Auto Exposure setting will not be used. The range of operation is about –1EV to +0.5EV. If both Gain and Shutter are operated in the AUTO mode by Auto Exposure, the ranges of operations of both are as follows. (However, these values are approximate values and may differ according to the adjusted and operating state of the camera.)

```
EV7              EV10                        EV17* (SX900)
 ├───────AGC───────┤────────CCD IRIS────────┤
```
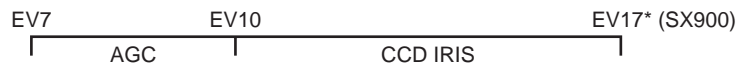
* EV16 for X700

◇ **Brightness**

The brightness of images can be controlled by changing the black level setting. Adjust the brightness if the appropriate gradation cannot be obtained due to the blurring of the black portions of the image.

The range of settings is about 0 to 75 (when gamma is ON (1) in full range 255).
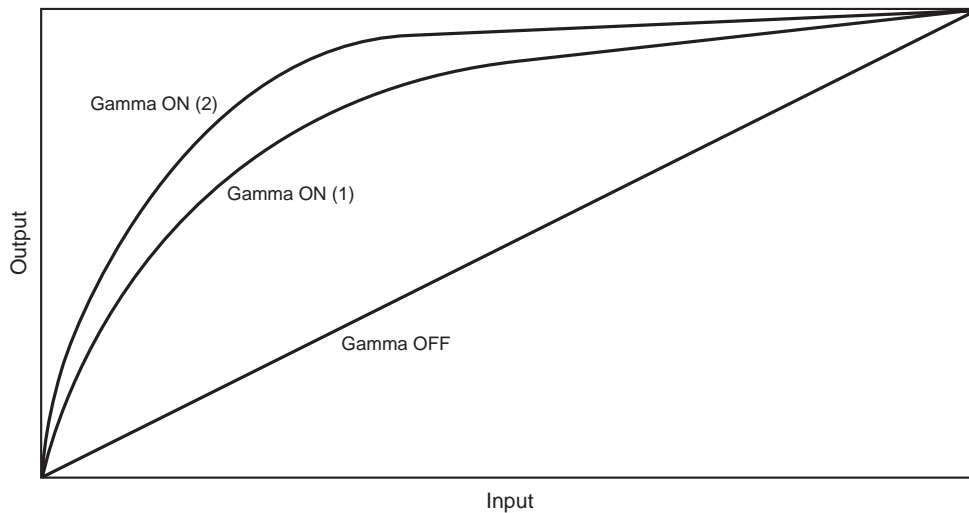
── **FUNCTIONS** ──

◇ **Gamma**

Used for setting gamma compensation to OFF, ON (1), or ON (2).

OFF   : Outputs CCD signals for image processing linearly.

ON (1) : For obtaining natural gradation taking into account the characteristics of the monitor.

ON (2) : For obtaining three-dimensional images with a subject that has a small luminance dynamic range.

Concept of Gamma Characteristics

◇ **Sharpness**

Used for adjusting sharpness of the image.

The sharpness can be changed by about more than 200% from the factory setting.

◇ **White Balance**

Used for adjusting white balance by adjusting R-gain and B-gain. White subjects can be shot in white by setting the white balance according to the color temperature of the luminance light. The White Balance operation mode can be selected from three modes – Manual, One Push, and ATW. The range of operation of each mode is as follows.

Manual   : 2,400 to 10,000 K or more

One Push : 2,400 to 10,000 K or more

ATW   : 2,650 to 6,000 K or more (Excluding fluorescent light)

◇ **Color Temperature**

This function was originally intended for selecting the optical filter. However with the DFW-SX900/X700, the R-gain and B-gain are set to the appropriate White Balance when color temperatures 3,200 K and 5,600 K light sources are used.

◇ **Hue**

Used for adjusting the hue of the image.

The hue can be changed by about more than ±15 degrees from the rotary angle of the NTSC Vector Scope luminance scope based on the factory setting.

═══ **FUNCTIONS** ═══

◇ **Saturation**

Used for adjusting the saturation of the image.

The saturation can be changed by about more than 150% from the factory setting.

◇ **Isochronous Start/Stop**

Used for turning ON/OFF the output of IEEE1394 isochronous transmitted images. When an image is being transmitted, the LED in front of the camera will light up orange.

◇ **One Shot**

Used for capturing only one image data (one frame) in the Isochronous OFF state, then transmitted in the Isochronous ON state. The difference between this function and Trigger described in the next section is that image input is started by the IEEE1394 command instead of external trigger signals. The timing at which exposure starts is also undefined (within 133.3 ms after the command is received with DFW-SX900 and within 66.7 ms with DFW-X700).

The LED in front of the camera lights up orange when image data is isochronously transmitted by the One Shot function.

◇ **Trigger**

Used for setting the external trigger mode to ON or OFF. No moving image signals are output in this mode.

Isochronous output is stopped at the point Trigger ON is set even in the Isochronous ON state. When external trigger pulses (TTL level, negative polarity, pulse width above 1 ms) are input, one image (one frame) is exposed for the specified time (specified at the shutter) will be output at the end of exposure. The time to the start of image data output after the external trigger pulse is input can be changed according to the exposure time.

◇ **Paint**

Used for changing the R-gain and B-gain by only the values specified at R-offset and B-offset respectively in the use of One Push White Balance. Use of this function is recommended when not adjusting White Balance to white. For example, when viewing a subject on the white 6,800 K monitor using a 3,200 K light source, this function can be used to adjust colors on the monitor to the same state as viewing a subject with the naked eye using a 3,200 K light source.

◇ **Y/Cr/Cb → R/G/B conversion**

The DFW-SX900/X700 outputs Y/Cr/Cb signals as digital image signals.

The equations for converting these signals to R/G/B signals are as follows.

$$R \approx 1.4022 Cr + Y$$
$$G \approx Y - 0.7144 Cr - 0.3457 Cb$$
$$B \approx 1.7710 Cb + Y$$

═ **FUNCTIONS** ═══

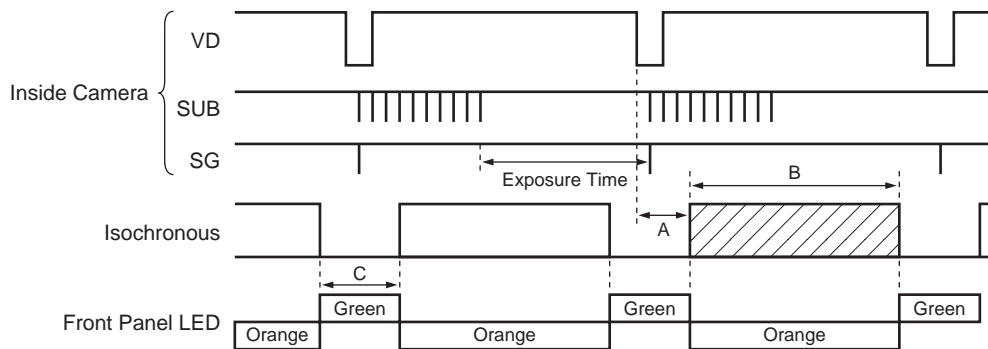## ■ Operations in Normal Mode

Exposure and readout are repeated according to the VD pulses inside the camera. As the operating timing of the camera differs according to the frame rate, it is described below.

The frame rates are shown in the following table.

Camera	When power on	When frame rate is reduced
DFW-SX900	7.5 fps = approx. 133 ms	3.75 fps = approx. 267 ms
DFW-X700	15 fps = approx. 67 ms	7.5 fps = approx. 133 ms

◇ When exposure time is 1 frame or shorter

VDs are generated continuously inside the camera and images are sent accordingly. The images are output at the cycle of the frame rate set.


Operations in Normal Mode

For the image output timing based on the falling edge of VDs generated inside the camera, image data output starts at the point the A period is passed, and the image data is output during the B period.

Camera	A [ms]	B [ms]	C [ms]
DFW-SX900 (7.5 fps)	Approx. 8	Approx. 120	Approx. 13
DFW-X700 (15 fps)	Approx. 2.4	Approx. 64	Approx. 2.6

Time until Data is Read Out and Output Period of Data

FUNCTIONS

When the output frame rate is reduced (3.75 fps of DFW-SX900, 7.5 fps of DFW-X700), images will be read out from the CCD for every VD. However, as every other image is used, the images read out during the isochronous output period will not be used.
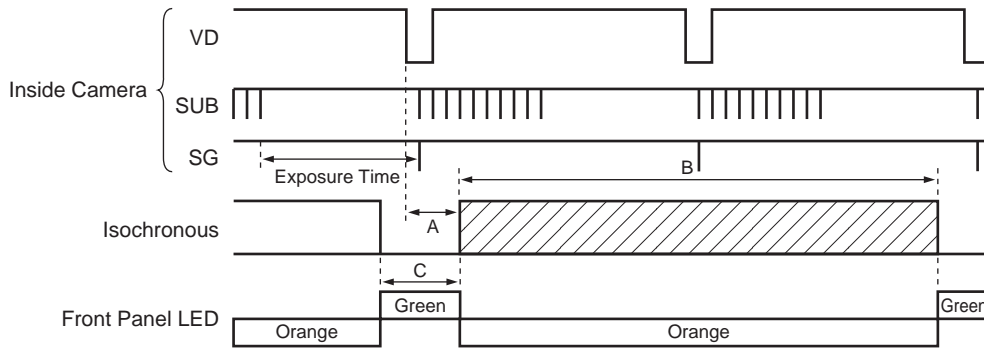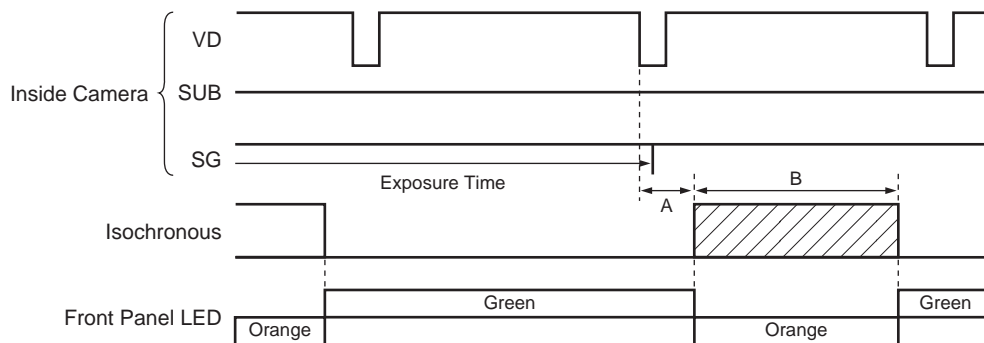
Operations When Frame Rate is Reduced

Camera	A [ms]	B [ms]	C [ms]
DFW-SX900 (3.75 fps)	Approx. 8	Approx. 240	Approx. 26
DFW-X700 (7.5 fps)	Approx. 2.4	Approx. 128	Approx. 5

Time until Data is Read Out and Output Period of Data

◇ When exposure time is over 1 frame

When exposure time over 1 frame is specified (extended exposing mode), the A period until images are output from the VDs and B period outputting images are the same as the above case. However, as no images are output during the exposure time, the actual frame rate will drop.

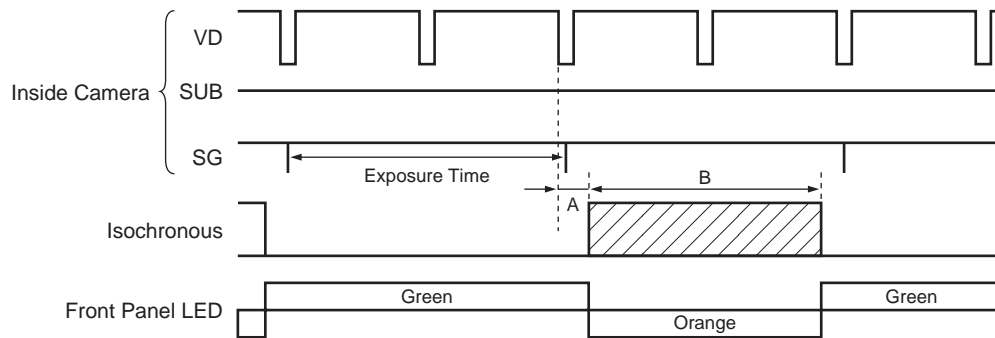**Operations in Extended Exposing Mode (In the Case of 2 Frames)**

Camera	A [ms]	B [ms]
DFW-SX900 (7.5 fps)	Approx. 8	Approx. 120
DFW-X700 (15 fps)	Approx. 2.4	Approx. 64

Time until Data is Read Out and Output Period of Data

FUNCTIONS

When the frame rate is reduced in the extended exposing mode, the timing will be as follows.

Operations in Extended Exposing Mode (In the Case of 2 Frames) When Frame Rate is Reduced

Camera	A [ms]	B [ms]
DFW-SX900 (3.75 fps)	Approx. 8	Approx. 240
DFW-X700 (7.5 fps)	Approx. 2.4	Approx. 128

Time until Data is Read Out and Output Period of Data

━━ **FUNCTIONS** ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━

■ External Trigger Shutter

This function is useful for the following cases.

- ● When capturing the images according to an arbitrary external trigger
- ● When capturing the images at the same time with several cameras

## ◇ Inputting trigger and pulse conditions

\<Inputting method\>

Input external triggers to the "TRIG IN" connector on the rear panel of the camera using the 4-pin connector provided.

As shown in the figure, the pin 3 is the "Trigger Input" and the pin 2 is the "GND". Design the cable accordingly.

\<Pulse conditions\>

The input pulse is a 5 V negative polarity pulse. Although the falling edge of the signal is detected as the start of trigger, the pulse width must be set 1 ms or more.

The trigger can also be applied by setting the pin 3 "Trigger Input" to the pin 2 "GND". (Take note of chattering at this time.)
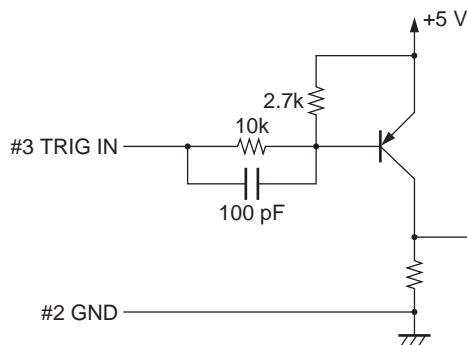
Pin No.	Signal
#1	NC
#2	GND
#3	TRIG IN
#4	NC
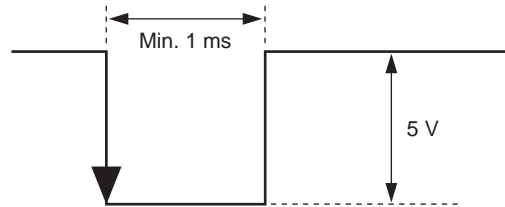
Trigger Pulse

**TRIG IN Connector (Rear Panel View)**

Trigger Input Circuit

═══ FUNCTIONS ═══

◇ **Internal operations of camera in trigger shutter operation mode**

A SUB pulse of about 3 μs width is generated immediately after trigger is input. Signals accumulated in the CCD sensor until then are eliminated, then the exposure is started. After the exposure time specified the shutter speed, VD is generated inside the camera. (Specifically, VD is generated about 10 μs before exposure ends.)

After the A period passes from the falling edge of the VD, images are output during the B period.
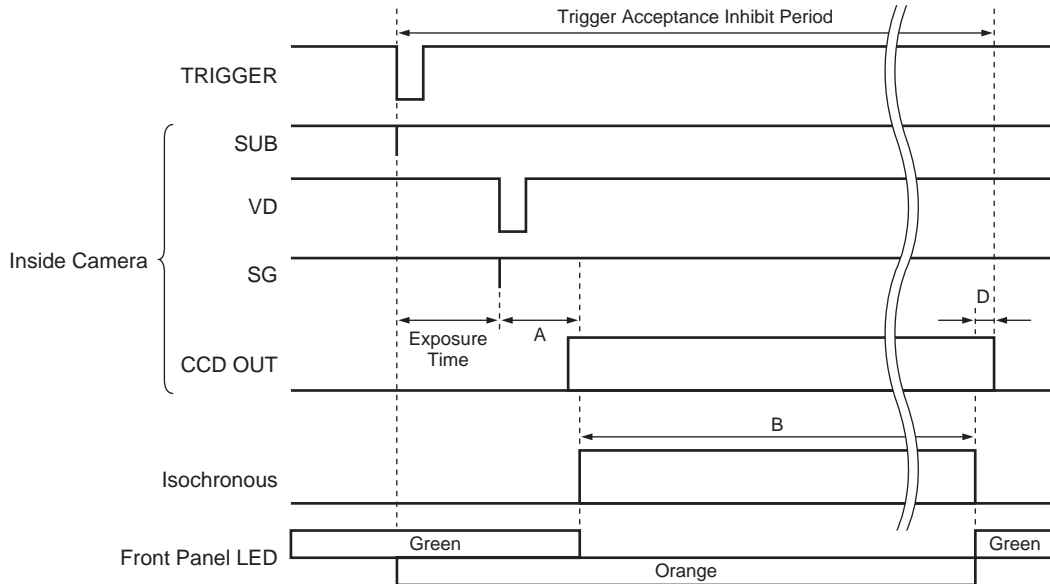
External Trigger Shutter Operations

Camera	A [ms]	B [ms]	D [ms]
DFW-SX900 (7.5 fps)	Approx. 8	Approx. 120	Approx. 4.2
DFW-X700 (15 fps)	Approx. 2.4	Approx. 64	Approx. 0

Time until Data is Read Out and Output Period of Data

FUNCTIONS

The trigger acceptance inhibit period continues until all of image has been transferred out of the camera.

When the transfer frame rate is reduced (3.75 fps of DFW-SX900, 7.5 fps of DFW-X700), data will continue to be transferred even after readout of the CCD has been completed as shown in the figure below. The trigger inhibit period continues until data transfer ends.

All trigger inputs to the camera during the "Trigger Acceptance Inhibit Period" will be ignored.

The following equation is one method of roughly calculating the acceptable trigger interval.

Trigger interval = Exposure time + Frame rate

Camera	Exposure Time	
	1/1,000s	1/100s
DFW-SX900 (When set to 7.5 fps)	Approx. 134 ms	Approx. 143 ms
DFW-X700 (When set to 15 fps)	Approx. 68 ms	Approx. 77 ms

Example of Acceptable Trigger Interval
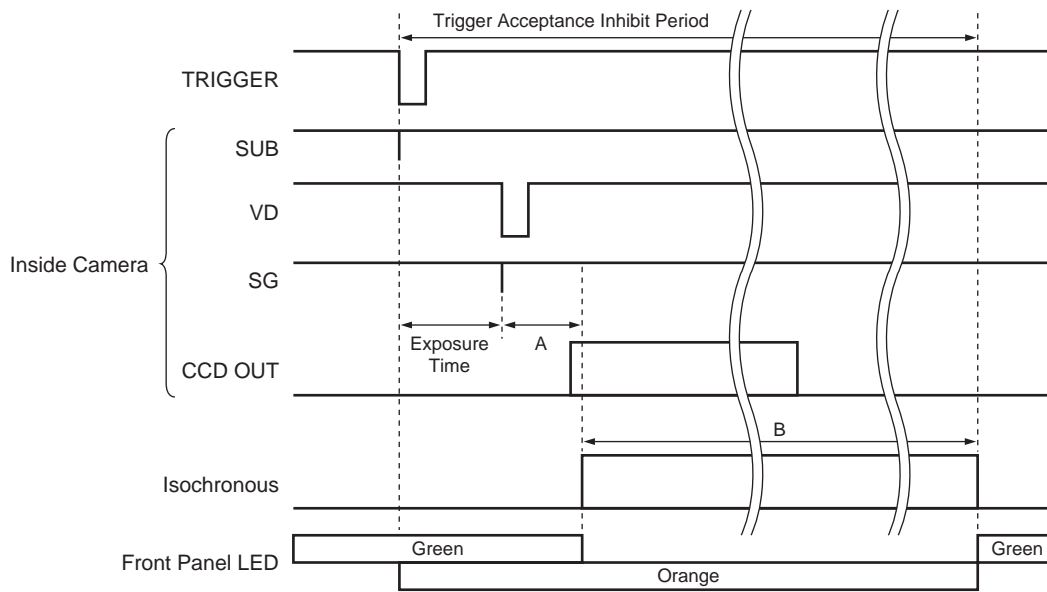
External Trigger Shutter Operations When Frame Rate is Reduced

━━ **FUNCTIONS** ━━━

■ Partial Scan Mode

The partial scan mode is a function for outputting part of the full image an area of interest, of the whole image.

When the screen size needs to be set to the full size (DFW-SX900: SXGA, DFW-X700: XGA), data volume and system bandwidth can be decreased by setting the required screen size using the partial scan mode (Format_7).
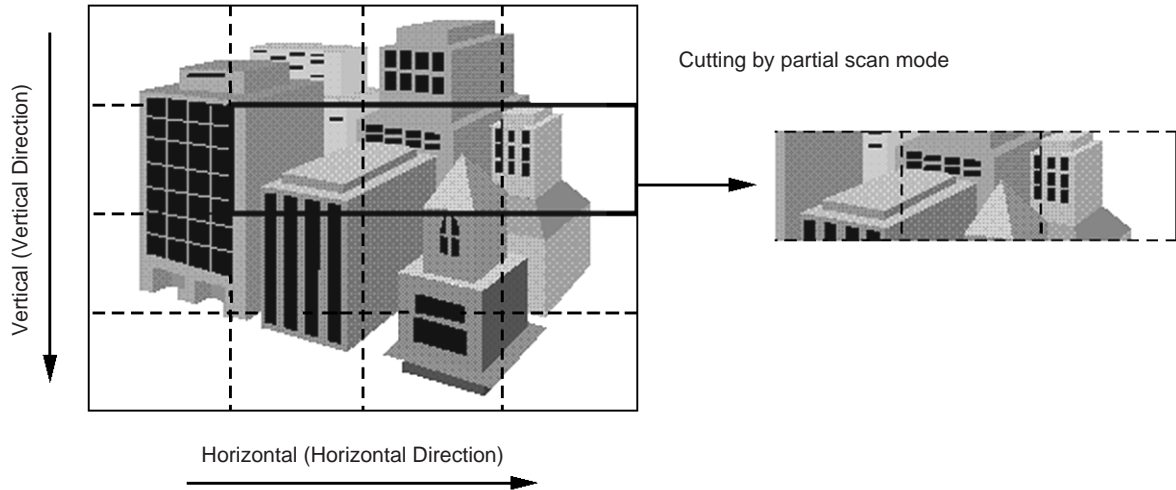
Cutting by partial scan mode

Vertical (Vertical Direction)

Horizontal (Horizontal Direction)

◇ Cutting size

Images can be cut only in rectangular shapes (including squares) and not with irregular features (convex and concave).

Minimum unit size is shown in the table below. Minimum unit sizes can be combined and cut out together. The position of each unit can be specified but can not exceed the full size of the screen.

Note) This function can be used in both the normal mode and external trigger mode.

The frame rate is the same as the normal rate.

Camera	Horizontal Size	Vertical Size
DFW-SX900	320	240
DFW-X700	512	192

Minimum Unit Size
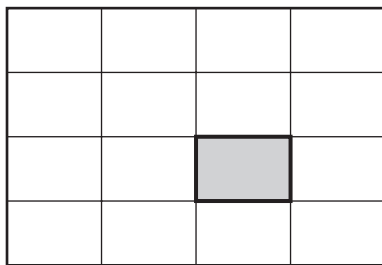
Minimum Unit Size for DFW-SX900

Minimum Unit Size for DFW-X700

═══ SETTINGS OF CAMERA CONTROL AND STATUS REGISTER ═══

● This chapter describes CSR addresses using the lower 32 bits of 64 bits. (CSR: Abbreviation of Control and Status Register) The omitted upper 32 bits are ****FFFFh. (**** changes according to the connection of the IEEE1394 Serial Bus.)

● Read/Write of the CSR is executed in units of Quadlet (4 bytes). The CSR address is the address of the leading byte of the Quadlet.

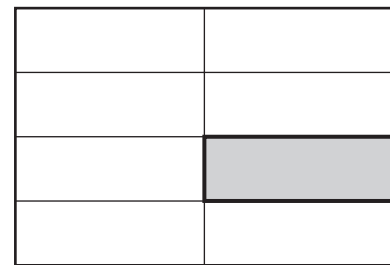● When describing the 32-bit command set for CSR in Hex, bit 0 is described as MSB (Most Significant Bit).

Example :　82012345h = 10000010　00000001　00100011　01000101b
　　　　　　　　　　　　　　　:　　　　　　　　　　　　　　　　　:
　　　　　　　　　　　　　　bit 0　　　　　　　　　　　　　　　bit 31

==

CSR F0F00000h　　Camera Initialize Register (Write Only)

Executes the same operations as when Factory Setup was selected in Current Memory Channel of CSR F0F00624h.

Command: 80000000h

Resets the CSR F0F00800h – F0F0088Ch functions to factory settings.
At this time, return the CSR F0F00624h Current Mem. channel also to "0".

==

CSR F0F00600h to F0F00624h control isochronous image transmission, and load/save settings of the camera.

CSR F0F00600h　　Current Frame Rate

Specify the Frame Rates 1 to 3.

Frame Rate	Command
1 (3.75 fps)	20000000h
2 (7.5 fps)	40000000h
3 (15 fps)	60000000h

NOTE : ● **Set when CSR F0F00614h Iso_EN is OFF (STOP).**
● **According to the settings of the CSR F0F0081Ch Shutter, isochronous transmission may be carried out at a lower rate than the frame rate set here.**
● **In the Trigger mode, the frame rate set here will not be effective. (As it depends on the cycle of the trigger signal.)**
● **Frame rate, image size, and Iso speed are used to determine IEEE-1394 bus Isochronous bandwidth allocated for normal (continuous) triggered operation.**

SETTINGS OF CAMERA CONTROL AND STATUS REGISTER

CSR F0F00604h   Current Video Mode

Specify the Video Modes 0 to 3.

Video Mode	Command
0	00000000h
1	20000000h
2	40000000h
3	60000000h

NOTE : **Set when CSR F0F00614h Iso_EN is OFF (STOP).**

CSR F0F00608h   Current Video Format

Specify the Video Format.

Video Format	Command
0	00000000h
1	20000000h
2	40000000h
7	E0000000h

NOTE : **Set when CSR F0F00614h Iso_EN is OFF (STOP).**

━━ ━━━ **SETTINGS OF CAMERA CONTROL AND STATUS REGISTER** ━━━━━━━

CSR F0F0060Ch   Isochronous Channel, Transmit Speed

Specify Isochronous Channel (0 – 0Fh), Transmit Speed (200M, 400M bps).

```
Speed                      Command
----------------------------------------------------
1 (200M bps)               n1000000h
2 (400M bps)               n2000000h
```

n: Isochronous Channel 0 – Fh

NOTE : ● **Set when CSR F0F00614h Iso_EN is OFF (STOP).**
● **The minimum Transmit Speed which can be selected differs according to Video Format, Video Mode, and Frame Rate. Set according to the following table.**

DFW-SX900

Frame Rate	Format0		Format1		Format2
	mode1	mode3	mode0	mode3	mode0
3.75	200M bps	200M bps	200M bps	200M bps	200M bps
7.5	200M bps	200M bps	200M bps	200M bps	400M bps

DFW-X700

Frame Rate	Format0		Format1	
	mode1	mode3	mode0	mode3
7.5	200M bps	200M bps	200M bps	200M bps
15	200M bps	200M bps	200M bps	400M bps

CSR F0F00614h   Isochronous Transmission Start/Stop

Set the Start/Stop of image transmission by Isochronous.

Start : Command = 80000000h
Stop : Command = 00000000h

NOTE : **Before setting Start of image transmission, set the CSR F0F00600h – F0F0060Ch.**

━━━ **SETTINGS OF CAMERA CONTROL AND STATUS REGISTER** ━━━

CSR F0F00618h Memory Save

The current settings of the camera using commands CSR F0F00600h – F0F0060Ch, CSR F0F00620h, and CSR F0F00800h – F0F0088Ch are memorized in the Memory Channel specified by CSR F0F00620h.
The settings will be preserved in the memory even when the camera power is turned off.

> Execute: Command = 80000000h

NOTE : ● **Before setting Execute, set the CSR F0F00620h Memory Save Channel.**
　　　　　 ● **Memory Save requires about one second to execute. After setting, do not write other commands for one second.**

<Settings that are saved>
- Frame Rate
- Video Mode
- Video Format
- Iso Channel Speed
- Memory Save Channel
- Brightness
- Auto Exposure
- Sharpness
- White Balance
- Hue
- Saturation
- Gamma
- Shutter
- Gain
- Trigger
- Optical Filter

CSR F0F0061Ch One Shot

Perform the isochronous transmission of images for only one frame.

> Execute: Command = 80000000h

NOTE : ● **Can be used only when CSR F0F00614h Iso_EN is OFF (STOP).**
　　　　　 ● **Do not set a new One Shot command until isochronous transmission ends after setting the One Shot command to CSR.**

━━ **SETTINGS OF CAMERA CONTROL AND STATUS REGISTER** ━━━━━━━

CSR F0F00620h   Memory Save Channel

Specify the Memory Channel (ch1, ch2) for memorizing the current camera settings.

        ch1: Command = 10000000h
        ch2: Command = 20000000h

CSR F0F00624h   Current Memory Channel

Read out the camera settings (ch1, ch2) memorized by the CSR F0F00618h Memory Save or the factory settings (Factory) from the memory, and set in the camera.

The Memory Channel that was specified last will be automatically memorized. When the power is turned ON the next time, the settings memorized in this Memory Channel will be effective.

Channel	Command
Factory	00000000h
ch1	10000000h
ch2	20000000h

===

CSR F0F00800h to F0F0088Ch control the various functions of the camera.

CSR F0F00800h   Brightness

Adjust the black level of the image.

Command = 820000nnh   nn: Adjust in the range of 60h (dark) – DFh (bright).
                                       60h is the standard value.

CSR F0F00804h   Auto Exposure

Adjust the exposure compensation of Auto Exposure.

Command = 820000nnh   nn: Adjust in the range of 00h (under) – FFh (over).
                                       80h is the standard value.

NOTE : **Auto Exposure will not be effective unless either the Shutter or Gain is set to Auto.**

CSR F0F00808h   Sharpness

Adjust the sharpness of the image contour.

Command = 820000nnh   nn: Adjust in the range of 00h (soft) – 07h (sharp).
                                       03h is the standard value.

━━ **SETTINGS OF CAMERA CONTROL AND STATUS REGISTER** ━━

CSR F0F0080Ch   White Balance

Adjust the red and blue gains to properly capture white subjects in color. Two types of automatic adjustment modes are available.

> **NOTE** : ● **If the CSR F0F00830h Trigger is set to ON or if the CSR F0F0081Ch Shutter setting is less than 800h, the Auto function cannot be used.**
> ● **The CSR F0F0088Ch Optical Filter is canceled by this command. (Priority to latter)**

(1)   Manual adjustment

Command = 820mm0nnh   mm: Adjust B-gain in the range of 00h (min) – FFh (max).
                                         nn : Adjust R-gain in the range of 00h (min) – FFh (max).
                                         80h is the standard value.

(2)   One-Push Auto White Balance

Perform automatic adjustment when command is received to maintain the white balance at that time.

Execute: Command = 86******h   ******: Undefined
When this operation is complete, the command is read out as 82******h (******: Undefined).

> **NOTE** : ● **Execute after capturing a white subject lit using the light source used for shooting over the whole screen at the appropriate exposure. It will take a maximum of 10 seconds to complete automatic adjustment.**
> ● **Execute again if the light source used for shooting has been changed.**

(3)   Auto Tracing White Balance

Perform automatic adjustment continuously to trace the white balance according to changes in the shooting conditions.

Execute : Command = 83******h   ******: Undefined
Stop   : Stop operations according to the following rules.
              ① Read out the CSR F0F0080Ch.
              ② Write the manual adjustment command at the value read out.
                 820mm0nnh
                 Set the values read out for mm, nn.

> **NOTE** : **Operations stop if the exposure is inappropriate.**

SETTINGS OF CAMERA CONTROL AND STATUS REGISTER

CSR F0F00810h   Hue

Adjust the hue of the image.

Command = 820000nnh

nn: Adjust in the range of 53h (right edge) – ADh (left edge).
80h is the standard value.

CSR F0F00814h   Saturation

Adjust the saturation of the image.

Command = 820000nnh

nn: Adjust in the range of 00h (light) – FFh (deep).
80h is the standard value.

CSR F0F00818h   Gamma

Set the gamma characteristics.

Gamma	Command
OFF	82000080h
ON (1)	82000081h
ON (2)	82000082h

81h is the standard value.

══ **SETTINGS OF CAMERA CONTROL AND STATUS REGISTER** ══

CSR F0F0081Ch   Shutter

Set the exposure time of the electronic shutter. Auto exposure (CCD IRIS) can be also set.

(1) Manual adjustment

Command = 82000nnnh

<When DFW-SX900>   nnn: Adjust in the range of 7F1h (long) – C2Dh (short).
B22h (1/30 sec) is the standard value.

2.0 sec $\geq$ Shutter Speed $\geq$ 1/7.5 sec
  nnn = 800h – 7.5 $*$ Shutter Speed (sec)
1/7.5 sec > Shutter Speed $\geq$ 1/5,882 sec
  nnn = 3116.4 – 7999 $*$ Shutter Speed (sec)
Shutter Speed = 1/10,000 sec
  nnn = C2Ch
Shutter Speed = 1/20,000 sec
  nnn = C2Dh

<When DFW-X700>   nnn: Adjust in the range of 7E2h (long) – B20h (short).
992h (1/30 sec) is the standard value.

2.0 sec $\geq$ Shutter Speed $\geq$ 1/15 sec
  nnn = 800h – 15 $*$ Shutter Speed (sec)
1/15 sec > Shutter Speed $\geq$ 1/8,361 sec
  nnn = 2848.4 – 11962 $*$ Shutter Speed (sec)
Shutter Speed = 1/20,000 sec
  nnn = B20h

> **NOTE** : **When nnn < 800h, do not turn ON the Gain and White Balance Auto functions.**

(2) Auto exposure (CCD IRIS)

ON : Command = 83000$***$h $***$: Undefined
OFF : Specify 82000mmmh. (Or read out the shutter speed once and rewrite the value.)

> **NOTE** : **When the CSR F0F00830h Trigger is ON, do not set Auto exposure to ON.**

(3) Shutter OFF

Command = 80000000h   At this time, the shutter speed will be 1/30 seconds.

━━ SETTINGS OF CAMERA CONTROL AND STATUS REGISTER ━━

Setting values of shutter speed for DFW-SX900

Exposure Time (sec.)	Setting Value (Decimal)	Setting Value (Hexadecimal)
2	2033	7F1H
1	2040	7F8H
1/2	2044	7FCH
1/3.75	2046	7FEH
1/7.5	2048	800H
1/15	2583	A17H
1/30	2850	B22H
1/50	2956	B8CH
1/60	2983	BA7H
1/125	3053	BEDH
1/250	3084	C0CH
1/500	3100	C1CH
1/1,000	3108	C24H
1/2,000	3112	C28H
1/5,000	3115	C2BH
1/10,000	3116	C2CH
1/20,000	3117	C2DH

Setting values of shutter speed for DFW-X700

Exposure Time (sec.)	Setting Value (Decimal)	Setting Value (Hexadecimal)
2	2018	7E2H
1	2032	7F0H
1/2	2040	7F8H
1/3.75	2044	7FCH
1/7.5	2046	7FEH
1/15	2048	800H
1/30	2450	992H
1/50	2609	A31H
1/60	2649	A59H
1/125	2753	AC1H
1/250	2801	AF1H
1/500	2825	B09H
1/1,000	2836	B14H
1/2,000	2842	B1AH
1/4,000	2845	B1DH
1/8,000	2847	B1FH
1/20,000	2848	B20H

SETTINGS OF CAMERA CONTROL AND STATUS REGISTER

CSR F0F00820h   Gain

Adjust the gain of the video signal amplifier. Auto Gain Control can be also set.

(1) Manual adjustment

Command = 82000nnnh   nnn: Adjust in the range of 800h (min) – 8B4h (max).
800h is the standard value.

(2) Auto Gain Control

ON : Command = 83000∗∗∗h   ∗∗∗: Undefined
OFF : Specify 82000nnnh. (Or read out the gain value once and rewrite the value.)

CSR F0F00830h   Trigger

When inputting a negative polarity signal to the TRIG IN connector at the back of the camera, isochronous transmission of images for only one frame will be performed.

ON : Command = 8200mnnnh   m = 0: mode0
m = 3: mode3

nnn becomes effective and internal trigger is generated repeatedly at intervals 10 ms times the value set.

OFF : Command = 80000000h

NOTE : **If the CSR F0F00600h – F0F0060Ch settings are not set properly and Iso_EN is not ON at the same time, no isochronous transmission of images will be executed even when trigger signals are input.**

CSR F0F0088Ch   Optical Filter

Set the appropriate white balance preset for the main light source.

Lighting	Command
tungsten lamp (3,200 K)	82000000h
day light (5,600 K)	82000001h

NOTE : **The CSR F0F0080Ch White Balance value is canceled by this command. (Priority to latter)**

SETTINGS OF CAMERA CONTROL AND STATUS REGISTER

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For Format7

When using Format7, parameters need to be set as shown in the following figure.
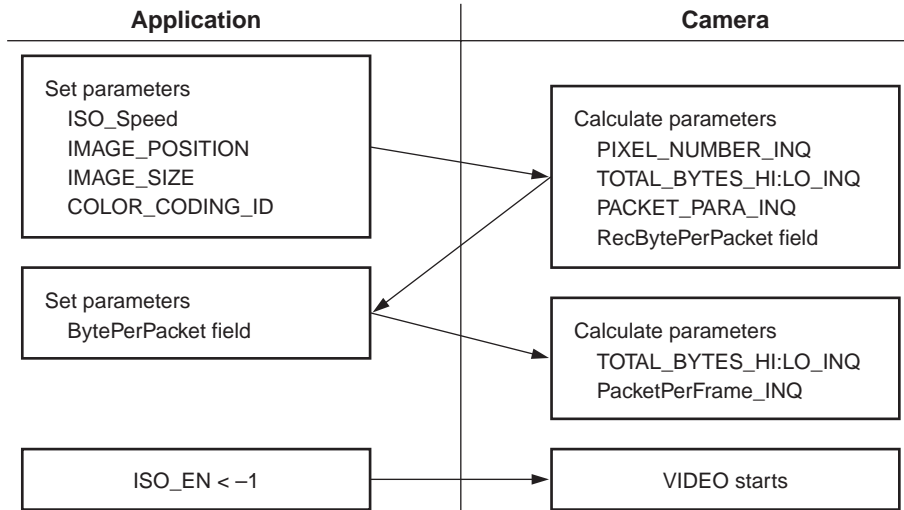
CSR F1000108h　　Image Position

Specify the coordinates at the top left of the screen when cutting one part of the screen by the partial scan function.
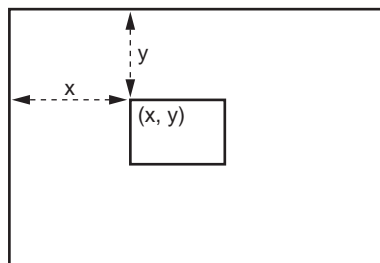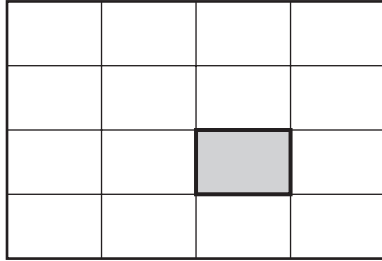

Command = 0mmm0nnnh　　　　　mmm: X coordinate pixel number (hexadecimal)
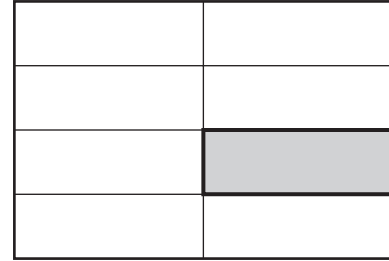
nnn : Y coordinate pixel number (hexadecimal)

SETTINGS OF CAMERA CONTROL AND STATUS REGISTER

CSR F100000Ch   Image Size

Set the size of the area when cutting one part of the screen by the partial scan function.

Minimum Unit for DFW-SX900

Minimum Unit for DFW-X700

Set the size of the area using the width and height of the rectangular area composed of the minimum units in the above figure.
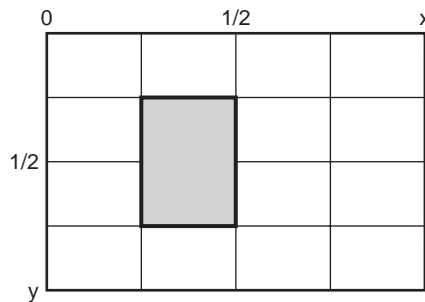
This area is 1/4 the width and 1/2 the height of the whole screen.

\<When DFW-SX900\>

Command = 0iii0jjjh   iii: Width of area   jjj: Height of area

Width (x)	i i i	Height (y)	j j j
1/4 of whole screen	140h (320)	1/4 of whole screen	0F0h (240)
1/2 of whole screen	280h (640)	1/2 of whole screen	1E0h (480)
3/4 of whole screen	3C0h (960)	3/4 of whole screen	2D0h (720)
Whole screen	500h (1,280)	Whole screen	3C0h (960)

\<When DFW-X700\>

Command = 0iii0jjjh   iii: Width of area   jjj: Height of area

Width (x)	i i i	Height (y)	j j j
		1/4 of whole screen	0C0h (192)
1/2 of whole screen	200h (512)	1/2 of whole screen	180h (384)
		3/4 of whole screen	240h (576)
Whole screen	400h (1,024)	Whole screen	300h (768)

═══ **SETTINGS OF CAMERA CONTROL AND STATUS REGISTER** ═══

Limitations : Set the area so that the bottom right of the rectangular area does not exceed the CCD output size.
When the CSR F1000108h Image Position is set to 0mmm0nnnh (mmm: X coordinates, nnn: Y coordinates), set the rectangular area so as to satisfy following two equations.

When DFW-SX900

$mmm + iii \leq 500h$ (Max Image Size: Hmax)

$nnn + jjj \leq 3C0h$ (Max Image Size: Vmax)

When DFW-X700

$mmm + iii \leq 400h$ (Max Image Size: Hmax)

$nnn + jjj \leq 300h$ (Max Image Size: Vmax)

NOTE : **Set when CSR F0F00614h Iso_EN is OFF (STOP).**

CSR F1000110h   Color Coding ID

Set the Color Coding ID when cutting one part of the screen by the partial scan function.
As both the DFW-SX900 and DFW-X700 support only Color Coding ID 2 (YUV: 422), always set ID 2.

Command = 02000000h

NOTE : **Set when CSR F0F00614h Iso_EN is OFF (STOP).**

CSR F1000144h   Byte per Packet

Set the Byte per Packet according to the value specified by CSR F1000140h Packet Para Inq.

When CSR F1000108h (Image Position) and CSR F100000Ch (Image Size) are set, the camera calculates the CSR F1000140h Packet Para Inq. Packet Para Inq specifies the maximum value and minimum unit of Byte per Packet.

When CSR F1000140h value is 0mmm0nnnh, set the command = 0iii0000h to CSR F1000144h.

mmm: Minimum unit

nnn : Maximum value

iii   : Integral multiple of the minimum unit which does not exceed the maximum value.

NOTE : **Enter the mmm or nnn value.**

◇ **General precautions for partial scan function**

● When settings of CSR related to partial scan mode (F0F0060Ch, F1000008h, F100000Ch, F1000010h) are changed, the camera will recalculate the specified value of CSR F1000140h Packet Para Inq each time.

● If incorrect settings are performed for CSR related to partial scan mode with the CSR F0F00614h Iso_EN in the ON state, isochronous transmission will be prohibited. In this case, set the correct settings for the CSR related to partial scan mode.

COMMAND SENDING PROCEDURE UNTIL IMAGES ARE DISPLAYED

(1) Acquiring the camera control register base address

Read out the Configuration ROM and acquire the base address of the camera control register.

The base address of the Configuration ROM is FFFF F0000000H.

	Offset	0 – 7	8 – 15	16 – 23	24 – 31
Bus Info Block	400H	04	1F	CE	D4
	404H	31	33	39	34
	408H	20	FF	60	00
	40CH	08	00	46	20
	410H	00	07	Serial No.	
Root Directory	414H	00	04	C8	0A
	418H	03	08	00	46
	41CH	0C	00	83	C0
	420H	8D	00	00	02
	424H	D1	00	00	04

Obtain the offset address for Node Uniq ID Leaf

420H + 000002H * 4 = 428H ◄

Obtain the offset address for Unit Directory

424H + 000004H * 4 = 434H ◄

	Offset	0 – 7	8 – 15	16 – 23	24 – 31
Node Uniq ID Leaf	428H	00	02	E7	33
	42CH	08	00	46	02
	430H	00	07	Serial No.	

	Offset	0 – 7	8 – 15	16 – 23	24 – 31
Unit Directory	434H	00	03	7D	AF
	438H	12	00	A0	2D
	43CH	13	00	01	01
	440H	D4	00	00	01

Obtain the offset address for Unit Dependent Info

440H + 000001H * 4 = 444H ◄

	Offset	0 – 7	8 – 15	16 – 23	24 – 31
Unit Dependent Info	444H	00	03	4F	EA
	448H	40	3C	00	00
	44CH	81	00	00	02
	450H	82	00	00	05

Obtain the offset address for Camera Control register

FFFFF0000000H + 3C0000H * 4 = FFFFF0F00000H ◄

The base address of the control register of this camera is FFFF F0F00000H.

═══ **COMMAND SENDING PROCEDURE UNTIL IMAGES ARE DISPLAYED** ═══

(2) Acquiring the format/mode/frame rate

a) Check available formats

Refer to the Inquiry register for video format and check the available formats.

Address	Action	Data
F0F00100h	Read	E1000000h (DFW-SX900)
		C1000000h (DFW-X700)

As bits 0, 1, 2, and 7 are set for the DFW-SX900, it means that Format0, Format1, Format2, and Format7 are available.
As bits 0, 1, and 7 are set for the DFW-X700, it means that Format0, Format1, and Format7 are available.

b) Check available video modes

Refer to Inquiry register for video mode, and check which video mode in each Format is available.

Address	Action	Data	
F0F00180h	Read	50000000h	When Format0
F0F00184h	Read	90000000h	When Format1
F0F00188h	Read	80000000h	When Format2 (00000000h for DFW-X700)
F0F0019Ch	Read	80000000h	When Format7

As bits 1 and 3 are set for the Format0, it means that Mode1 and Mode3 are available.

c) Check available frame rates (Example: Format0 Mode3)

Address	Action	Data
F0F0020Ch	Read	60000000h (DFW-SX900)
		30000000h (DFW-X700)

As bits 1 and 2 are set for the DFW-SX900, it means that 3.75 fps and 7.5 fps are available.
As bits 2 and 3 are set for the DFW-X700, it means that 7.5 fps and 15 fps are available.

COMMAND SENDING PROCEDURE UNTIL IMAGES ARE DISPLAYED

(3) Video transmission start command

When the following values are set for Status and Control registers for the camera, the camera starts video transmission.
(Example: DFW-SX900, Video Format = 2, Video Mode = 0, Frame Rate = 7.5 fps, ISO Speed = 400M bps)

Address	Action	Data	
F0F00600h	Write	40000000H	Frame Rate = 7.5 fps
F0F00604h	Write	00000000H	Video Mode = 0
F0F00608h	Write	40000000H	Video Format = 2
F0F0060Ch	Write	12000000H	ISO ch = 1, Speed = 400M bps
F0F00614h	Write	80000000H	ISO Enable ON

To stop the video, set the ISO Enable bit to 0.

Address	Action	Data	
F0F00614H	Write	00000000H	ISO Enable OFF

(4) To set the trigger mode

Set Status and Control register for feature and set the trigger mode to ON.

Address	Action	Data	
F0F00830h	Write	82000000h	Trigger ON, mode 0

As bit 0 is the Presence Inq bit, it cannot be written. Consequently, even if 02000000H is written for Data, the same operations are performed.

━━ **COMMAND SENDING PROCEDURE UNTIL IMAGES ARE DISPLAYED** ━━

(5) Procedure for Format7

a) Aquire the available mode for Format7.

Address	Action	Data
F0F0019Ch	Read	80000000h

As bit 0 is set, it means that mode 0 is available.

b) Acquire the CSR offset address of Mode0.

Address	Action	Data
F0F002E0h	Read	00400040h

F0000000h + (00400040h ∗ 4) = F1000100h

It means that the offset address of Video Mode CSR for Format7_Mode0 is F1000100h.

c) Acquire the MaxSize/UnitSize/ColorCodingID.

Address	Action	Data	
F1000100h	Read	050003C0h (DFW-SX900) 04000300h (DFW-X700)	MaxSize
F1000104h	Read	014000F0h (DFW-SX900) 020000C0h (DFW-X700)	UnitSize
F1000114h	Read	20000000h	ColorCodingID

It means that MaxSize is $1,280 \times 960$, UnitSize is 320×240, ColorCodingID is YUV 4 : 2 : 2 for the DFW-SX900.
It means that MaxSize is $1,024 \times 768$, UnitSize is 512×192, ColorCodingID is YUV 4 : 2 : 2 for the DFW-X700.

d) Set the ImagePosition/ImageSize/ColorCodingID.

The DFW-SX900 is described as an example.

Address	Action	Data		
F1000108h	Write	014000F0h	ImagePosition	Specify top left (320, 240)
F100010Ch	Write	028001E0h	ImageSize	Specify size (280, 480)
F1000110h	Write	02000000h	ColorCodingID	

NOTE : **For YUV 4 : 2 : 2, write 02000000h for ColorCodingID.**
Take note that this can easily be mistaken for the previously mentioned ColorCodingID 20000000h.

COMMAND SENDING PROCEDURE UNTIL IMAGES ARE DISPLAYED

e) Specify the packet size.

Address	Action	Data	
F1000140h	Read	02800140h	Unit = 320, Max = 640

This camera is designed so that Unit is the minimum Frame Rate and Max is the maximum Frame Rate.

Set a value which is the integral multiple of the Unit and at the same time does not exceed the maximum value for the packet size.

Address	Action	Data	
F1000144h	Write	02800000h	Packet size = 640

The speed of isochronous transmission and bandwidth allocated is determined by the packet size.

NOTE : **When ImagePosition/ImageSize/ColorCodingID are set at step d), the camera recalculates and reflects the contents of CSR F1000140h PacketParaInq register.
If the packet size is changed, be sure to perform this procedure.**

f) Acquire the TotalBytes.

Address	Action	Data	
F1000138h	Read	00096000h	Lower 32 bits
F100013Ch	Read	00000000h	Upper 32 bits

Image data size sent by the camera. For application software, secure a buffer of this size and prepare to receive data transmitted isochronously.

(6) Video transmission start command (Format7)

When the following values are set for Status and Control registers for the camera, the camera starts video transmission.

Address	Action	Data	
F0F00604h	Write	00000000H	Video Mode = 0
F0F00608h	Write	E0000000H	Video Format = 7
F0F0060Ch	Write	12000000H	ISO ch = 1, Speed = 400M bps
F0F00614h	Write	80000000H	ISO Enable ON

To stop the video, set the ISO Enable bit to 0.

Address	Action	Data	
F0F00614H	Write	00000000H	ISO Enable OFF

As there is no concept for the frame rate for Format7, the specification of CSR F0F00600h FrameRate will be ineffective.

COMMAND SETTING AND OPERATION TIMING

The DFW-SX900/X700 operates synchronously with internal pulses called VD. VDs are reference signals inside the camera and cannot be observed from outside the camera.

Even if commands are set to the CSR of the camera, it does not mean that they become effective the instant they have been written. They become effective after the VD period set to the CSR has been completed and the next VD pulse is generated as shown in the following figure. The command settings are set for video signals by the Isochronous output after that. (The timing at which the command settings become effective may be delayed according to the internal state of the camera.)

When operating at a low frame rate even if the transmission time of one frame exceeds one VD, and the CSR settings are changed during transmission, the command settings will not be set to the video signals until the frame currently being output is complete.
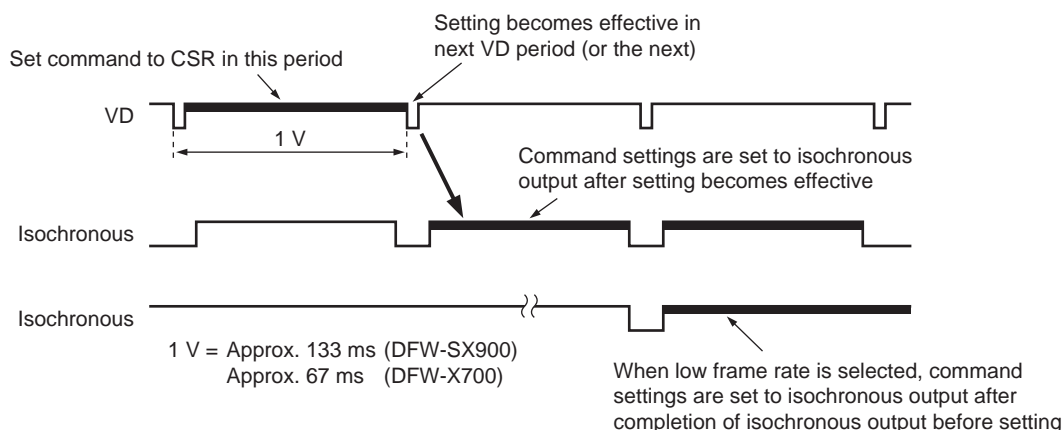
◇ **Isochronous Transmission Start/Stop command and actual operation timing**

As shown in the following figure, it takes at least about 1 V for the actual isochronous transmission of image data to start or stop after the Isochronous Start/Stop command (CSR F0F00614h: ISO_EN) has been set to the CSR of the camera. (VDs are the reference signals inside the camera and cannot be observed from outside the camera.)

Isochronous transmission start/stop is executed in units of frames. Isochronous transmission will not start/stop before one image output ends. This means that if a low frame rate at which the transmission of one image takes a long time is selected, the time taken for executing Isochronous Stop will be long.
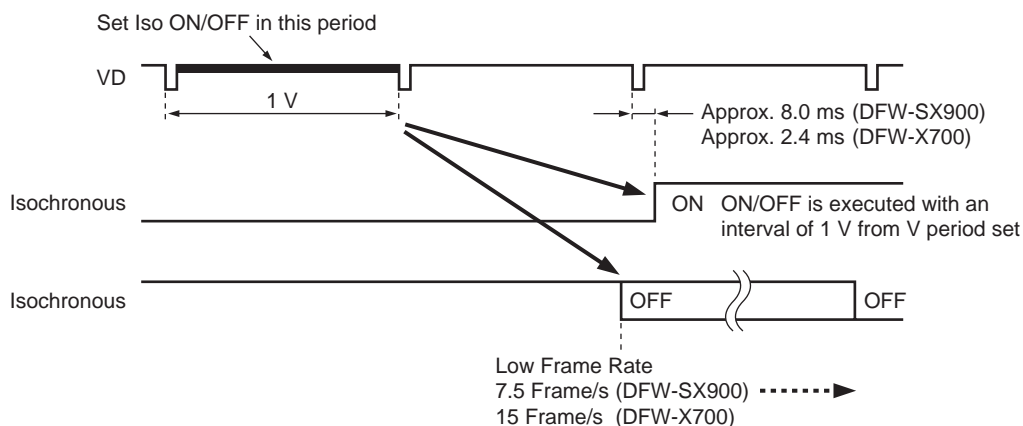
If Shutter (CSR F0F0081Ch) is set to the extended exposing mode, command execution may be delayed for the exposure time at maximum in addition to the previous delay for both Isochronous Start/Stop.

═══ **COMMAND SETTING AND OPERATION TIMING** ═══

◇ **One Shot CMD and actual operation timing**

As shown in the following figure, it takes at least about 1 V for the actual isochronous transmission to start after the One Shot command (CSR F0F0061Ch) has been set to the CSR of the camera.

(VDs are the reference signals inside the camera and cannot be observed from outside the camera.)
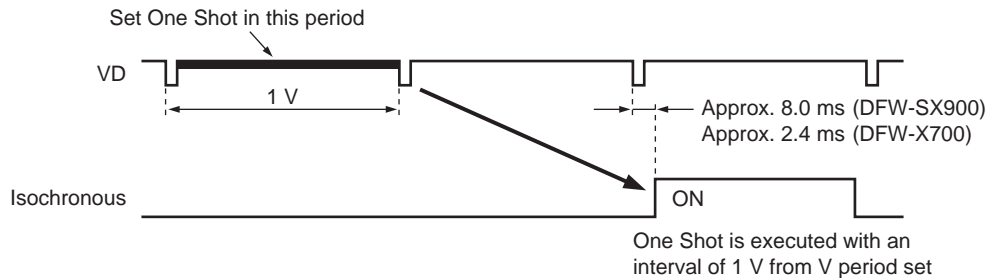

If Shutter is set to the extended exposing mode, isochronous transmission start may be delayed for the exposure time at maximum in addition to the previous delay.

Do not set a new One Shot command until isochronous transmission ends after the One Shot command has been set to the CSR.

◇ **Trigger Mode command and actual operation timing**

As shown in the following figure, it takes about 430 ms (DFW-SX900), 360 ms (DFW-X700) at least for external trigger signals to be received (Trigger Mode) after the Trigger ON command has been set to the CSR (F0F00830h) of the camera.
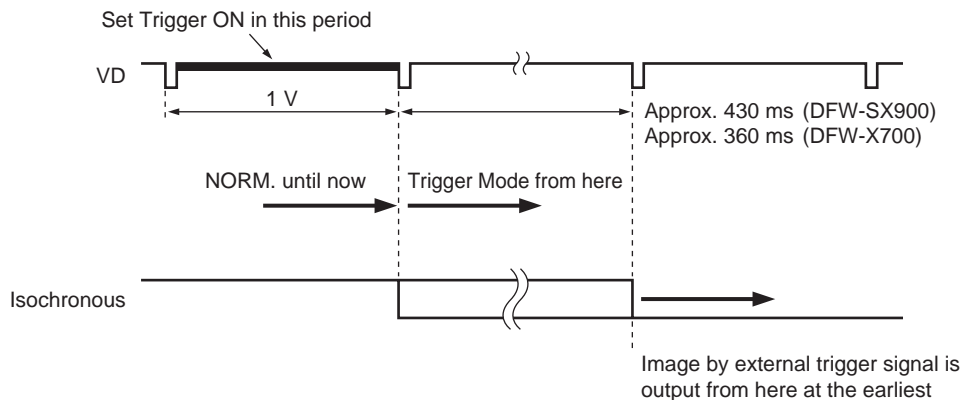
COMMAND SETTING AND OPERATION TIMING

As shown in the following figure, it takes at least about 50 ms for external trigger signals to not be received after the Trigger OFF command has been set to the CSR (F0F00830h) of the camera.

When low frame rate at which the transmission of one image takes a long time is selected, isochronous transmission may not have been completed when Trigger OFF is executed. In this case, output of normal moving images will start after transmission ends.
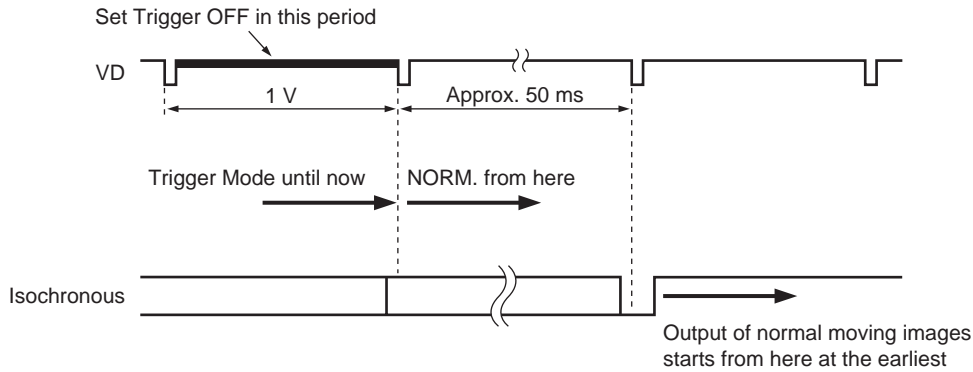

◇ **Timing between external trigger signal and video signal output**

When the Trigger Mode (CSR F0F00830h) is set to ON, the camera will start exposure as shown in the following figure when it detects the external trigger signal.

After the exposure time is set by the Shutter command (CSR F0F0081Ch), VD pulses will be generated inside the camera. Images will be isochronously output after the A period from the falling edge of the VD.

(The following figure shows an example where the frame rate is 7.5 fps for the DFW-SX900, and 15 fps for the DFW-X700.)
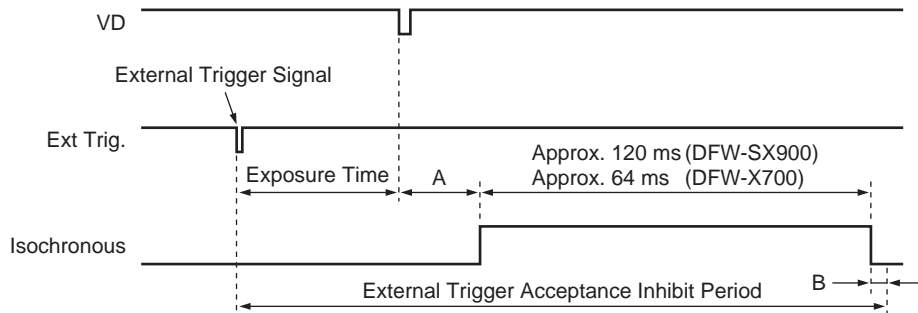
Camera	A [ms]	B [ms]
DFW-SX900 (7.5 fps)	Approx. 8	Approx. 4.2
DFW-X700 (15 fps)	Approx. 2.4	Approx. 0

SUPPLEMENTS

List of Camera Functions

Functions	CCM-DS250	DFW-V300	DFW-V500	DFW-VL500	DFW-X700	DFW-SX900
Brightness	○	○	○	○	○	○
Auto Exposure	○	○	○	○	○	○
Sharpness	○	○	○	○	○	○
White Balance	○	○	○	○	○	○
Hue	○	○	○	○	○	○
Saturation	○	○	○	○	○	○
Gamma			○	○	○	○
Electronic Shutter	○	○	○	○	○	○
Gain	○	○	○	○	○	○
Lens Iris	○			○		
Focus	○			○		
Zoom	○			○		
External Trigger			○	○	○	○
Preset White Balance			○	○	○	○
Electronic Pan					○	○
Electronic Zoom					○	○
Paint (Vendor Unique)					○	○

IEEE1394 Cable

Cameras Provided with Cables	Cable Terminal Shape (Camera Side)	Cable Terminal Shape (Another Side)	Connectable Cameras
CCM-DS250 (Length of cable: 2 m)	No latch	No latch	CCM-DS250 XCD-SX900 DFW-V300 XCD-X700 DFW-V500 DFW-SX900 DFW-VL500 DFW-X700
DFW-V300 DFW-V500 DFW-VL500 (Length of cable: 4.5 m)	With latch	With latch	DFW-V300 DFW-V500 DFW-VL500
XCD-SX900 XCD-X700 DFW-SX900 DFW-X700 (Length of cable: 4.5 m)	With latch	No latch	XCD-SX900 XCD-X700 DFW-SX900 DFW-X700

══ HOST ADAPTER CARD DFWA-400 ══

The DFWA-400 host adapter card is an IEEE1394 serial bus interface card. You can install this card in the PCI bus slot in IBM PC/AT compatible computer.

■ Features

PCI interface

● Complies with PCI Short Card (5 V, 32-bit) standard

● Complies with PCI Local Bus Rev 2.1 standard

● Supports the PCI Bus Master function

● Supports the PCI Bus DMA transfer function

IEEE1394 interface

● High-speed data transfer rate: 100M/200M/400M bits/second

● Supports both asynchronous transfer and isochronous transfer

● Supports the isochronous cycle master function

● Provides three 6-pin connectors to connect the camera module

■ Recommended Specifications for Personal Computer (PC)

Processor	: Pentium 500 MHz or more
Free main memory	: 40 MB or more
Video memory	: 8 MB or more
Display mode	: Can display $1{,}280 \times 1{,}024$ (true color)
Expansion slot	: With $1 \times$ PCI bus
OS	: Windows* 98 or Windows* NT4.0

> **NOTE** : **For details on the peripherals and the computer to which you are connecting the DFWA-400 card, see the respective manuals.**

* "Windows" is a trademark of Microsoft Corporation, registered in the U.S.A. and other countries.

Note) Zenkuman (indicated on the card) is a registered trademark of Technoscope, Co., Ltd.

━━ **HOST ADAPTER CARD DFWA-400** ━━

■ Specifications

|	
I/F standard	: IEEE1394-1995 standard
Chip set	: PCI Lynx
Number of ports	: 3
Supply voltage	: +5 V, +12 V
Operating temperature	: 10 to 35°C (no condensation)
Dimensions	: 107×138 mm
Connectors	
IEEE1394	: IEEE1394 6-pin connector
External power supply	: 176153-4 (AMP) or equivalent
Accessories	: Setup disk (1), Operating Instructions (1)

Board configuration
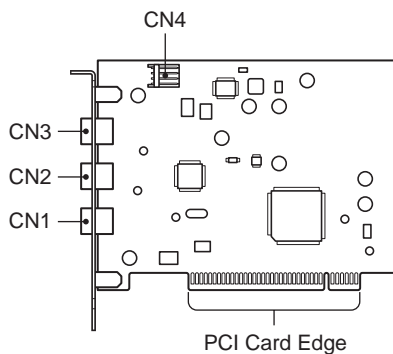
CN1, 2, 3   : IEEE1394 6-pin connector
CN4   : External power supply connector
PCI card edge : 124-pin PCI local bus connector
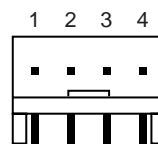
Pin assignment

IEEE1394 6-pin connector
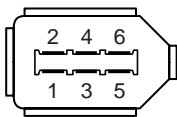
Pin No.	Signal
1	VP
2	VG
3	TPB*
4	TPB
5	TPA*
6	TPA

Common to CN1, CN2, and CN3.

External power supply connector

Pin No.	Signal
1	+12 V
2	GND
3	GND
4	+5 V (Not used)

External power supply connector

The IEEE1394 bus power supplied from PCI bus is about 0.5 A. If you need more power, use a separate power branch cable and connect the FDD power socket to this connector. You can get up to 1.5 A power through this connector.

(Example: Mounted connector 176153-4 (AMP))

═══ **HOST ADAPTER CARD DFWA-400** ═══════════════════════

■ Installing the Host Adapter Card

NOTE : **Before installing the host adapter card in the computer, be sure to install the setup disk software provided. Otherwise the computer may freeze when started.**

(1)   After starting the computer, insert the floppy disk provided into the floppy disk drive.

(2)   Open "My Computer" and select the floppy disk drive.

(3)   Open Readme.txt.

(4)   While reading Readme.txt, install the software.

(5)   After installing, eject the floppy disk, shut down Windows, and turn off the power of the computer.

(6)   Unplug the computer power cable from the wall outlet.

NOTE : **Make sure you unplug the computer power cable from the wall outlet. Installing the host adapter card without unplugging the power cable may damage both the computer and the card.**

(7)   Open the computer case and remove the PCI bus slot cover.

(8)   Securely insert the host adapter card into the PCI bus slot and affix in place it with the screw.
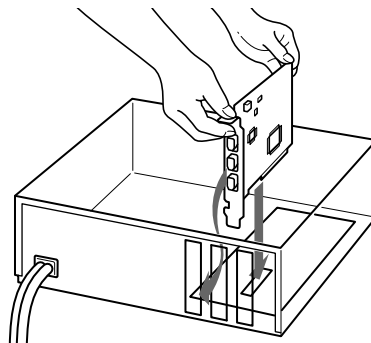
NOTE : ● **When you install the card, hold the top part of the card. Make sure that the PCI card edge is parallel to the slot. Insert the card into the slot as straight in as possible.**
● **You may need to apply some force when installing the card into the slot. Insert the card until the card snaps into the slot.**
● **If you are having difficulty inserting the card properly, remove it from the slot and try again.**
● **Some computers do not require a screw to affix the card in place.**

(9)   Install the computer case.

═══ **HOST ADAPTER CARD DFWA-400** ═══

■ **Setup of the Driver**

◇ **Precautions**

(1) Precautions on installing the DFWA-400 in the PC using Windows 98

The DFWA-400 does not run with the standard Windows 98 IEEE1394 driver.

If the DFWA-400 is run with the standard driver, the PC may crash. To prevent this, before installing the DFWA-400 in the PC, make sure to install the DFWA-400 driver.

To ensure this, be sure to perform the following procedure in Setting Up the Driver (for Windows 98).

Operations may not be performed normally if the board is installed without following the procedure below.

(2) Precautions on software provided

● The driver and demonstration software included in the floppy disk (hereafter referred to as FD) provided are compatible only for Windows 98 and Windows NT4.0. In any other operating system, these will not operate. Use of the driver and demonstration software may cause malfunction or damage to user's hardware and software. Sony Corporation is not liable for any of such damages.

● The demonstration software can be used for both Windows 98 and Windows NT4.0.

● The demonstration software can operate only with the Sony IEEE1394 digital camera DFW and XCD series*. It will not operate with other Sony products such as the Digital Handycam.

● During use with the DFW-V300, the demonstration software may not operate normally in some video modes.

● If the demonstration software does not operate normally during use, shut down the demonstration software, disconnect and reconnect the camera cable, and start the demonstration software again.

● Display color modes which can be displayed for the demonstration software are 24 bits and 32 bits. Other color modes are not supported.

● If the PC performance (CPU clock, memory installed, etc.) is insufficient, the demonstration software may not operate normally.

* The Sony IEEE1394 digital camera DFW and XCD series include the DFW-V300, DFW-V500, DFW-VL500, DFW-SX900, DFW-X700, XCD-SX900, and XCD-X700. (The CCM-DS250 does not operate with this software.)

═══ **HOST ADAPTER CARD DFWA-400** ═══

◇ **Setting up the driver**

<For Windows 98>

(1)   Turn on the PC power without installing the DFWA-400 in the PC, and start Windows.

(2)   Start \Setup98\Setup recorded in the FD.

(3)   After ejecting the FD, quit Windows, and turn off the PC power.

(4)   Unplug from wall outlet.

(5)   Install the DFWA-400 in an expansion PCI bus slot.

(6)   Turn on the PC power, and start Windows.

(7)   The DFWA-400 will be identified by the Windows Plug and Play function. For the driver used, select \Setup98\Driver\SonyPFW.inf in the FD.

(8)   After installing the driver, eject the FD and restart the PC according to the message on screen.

<For Windows NT4.0>

(1)   Turn on the PC power, and start Windows.

(2)   Execute \SetupNT\Setup.exe in the FD. (The installer starts automatically.)

(3)   After installing the software, select "No, I will restart my computer later".

(4)   After ejecting the FD, quit Windows, and turn off the PC power.

(5)   Unplug from wall outlet.

(6)   Install the DFWA-400 in an expansion PCI bus slot.

(7)   Turn on the PC power, and start Windows.

This completes the setup of the driver.

◇ **Setting up the demonstration software**
Copy \Demo\Dfwnt.exe in the FD to the desired directory for both Windows 98 and Windows NT4.0.

Sales Office :

Japan
http://www.sony.co.jp/ISP/

Sony Corporation (JAPAN)
4-14-1, Asahi-cho, Atsugi-shi, Kanagawa-ken,
243-0014 Japan
Tel: +81-46-230-5873   Fax: +81-46-230-6243

USA
http://www.sony.com/videocameras

Sony Electronics Inc.
HQ
1 Sony Drive, Park Ridge, NJ 07656
Tel: +1-800-686-7669

Canada

Sony of Canada Ltd.
115 Gordon Baker Rd, Toronto, Ontario M2H 3R6
Tel: +1-416-499-1414   Fax: +1-416-497-1774

Europe
http://www.pro.sony-europe.com/isp/

Sony Broadcast & Professional
HQ
Schipholweg 275, 1171 PK Badhoevedorp, The Netherlands
Tel: +31-20-44-99-351   Fax: +31-20-44-99-333

Germany
Hugo-Eckener-Str. 20, D-50829 Koln
Tel: +49-221-5378-923   Fax: +49-221-537-491

France
16-26, rue Morel 92110 Clichy
Tel: +33-1-55-90-41-58   Fax: +33-1-55-90-42-20

UK
The Heights, Brooklands, Weybridge, Surrey KT13 0XW
Tel: +44-990-331122   Fax: +44-1932-817011

Nordic
Per Albin Hanssons vag 20 S-214 32 Malmo Sweden
Tel: +46-40-190-800   Fax: +46-40-190-450

Italy
Via Galileo Galilei 40 I-20092 Cinisello Balsamo, Milano
Tel: +39-02-618-38-431   Fax: +39-02-618-38-402

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