HITACHI

Progressive scan type (1k X 1k) CCD camera

KP-F110 (tentative name)

Specifications (preliminary)

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1. Overview

The KP-F110 is a high resolution full frame shutter monochrome CCD camera utilizing a progressive scan type CCD.
Output is non-interlace at 30 frames per second.
High resolution is obtained from 1 million picture elements, while the camera is equipped with numerous functions, including digital output, multi-step electronic shutter, HD/VD external sync and frame on demand.
In addition, the CCD comprising square lattice unit pixels results in an image suitable for applications such as image processing.

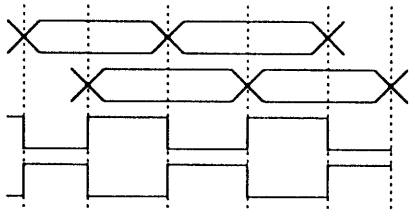
2. Outstanding features

(1) High resolution
The most recent high grade CCD having 1024 (H) by 1024 (V) effective square lattice picture elements is utilized.
(2) Frame shutter
The frame shutter function provides high vertical resolution of shifting objects.
(3) Multi-step electronic shutter
The shutter speed is selectable in 8 steps from 1/30 to 1/10,000 second.
(4) Frame on demand
Images captured at a desired timing by an external trigger signal can be obtained instantly as video. The capture time can also be adjusted by the external trigger and shutter.
(5) Digital output is RS-422A.
(6) Interlace mode (dedicated) is available on order.

3. Specifications

(1) Pickup element	2/3-inch interline CCD
Effective pixels	1024 (H) × 1024 (V)
(2) Scanning system	Non-interlaced
(3) Aspect ratio	1 : 1
(4) Frame rate	30 frames/second
(5) Horizontal scanning frequency	33.75 kHz
(6) Vertical scanning frequency	30 Hz (1125 lines)
(7) Synchronization	Internal/external (automatic switching)
(8) Lens mount	C mount
(9) Flange focal distance	17.526 mm
(10) Video output	
Analog output	1.0 Vp-p 75 Ω unbalanced Video: 0.7 Vp-p Sync : 0.3 Vp-p
Digital output	RS-422A Data : dual channel 10 bits, 24.3 MHz/channel Clock: 1 bit × 2

Data A (D9 - D0: ±)
Data B (D9 - D0: ±)
Clock (+)
Clock (-)



Clock frequency: 24.3 MHz

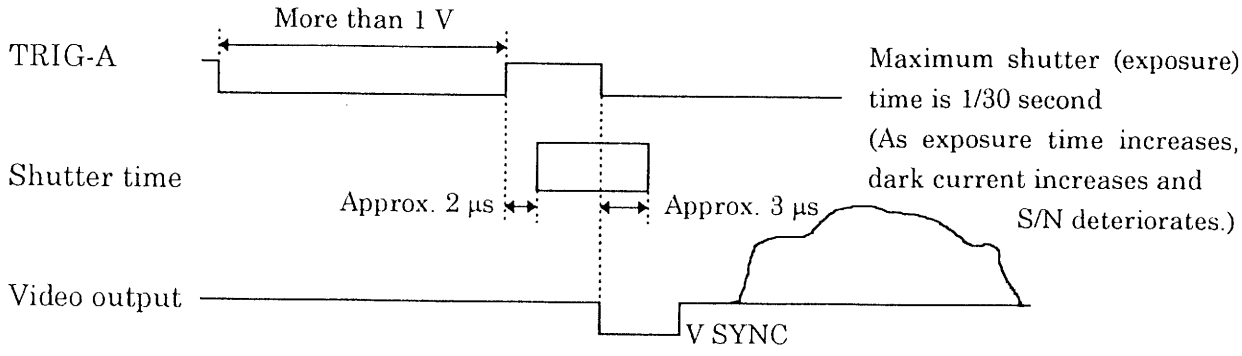
(Note: Max. digital output cable length is 2 meters.)

(11) External sync input	HD/VD 2 to 6 Vp-p negative Input impedance: 1 k Ω Frequency deviation: ± 0.005 %
(12) Sensitivity	400 lux, F4, 3200 K
(13) S/N	50 dB (analog output, internal sync, 1/30 s shutter speed)
(14) Electronic shutter speed	Selectable 1/30, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000 second by external switch. Factory setting is 1/30 second.
(15) Gain fine adjust	Variable ± 3 dB by internal control
(16) Frame on demand	Externally switched on/off, factory setting is off Externally switched one trigger, two trigger and fixed shutter modes, factory setting is one trigger External trigger: CMOS level

When the frame on demand (FD) switch is on, a video output is not produced unless a trigger pulse input is supplied.

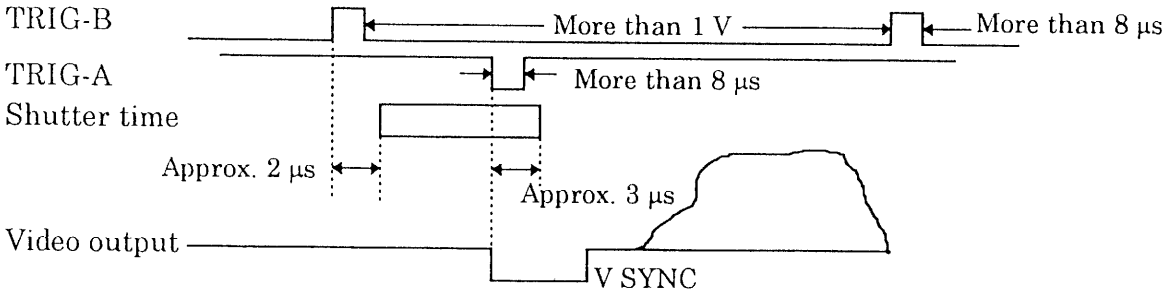
1T: One trigger mode

When a single trigger pulse (TRIG-A) is applied, exposure starts at the pulse rising edge and ends at the falling edge. The video output is obtained immediately after vertical sync reset. The pulse width equals the exposure time.



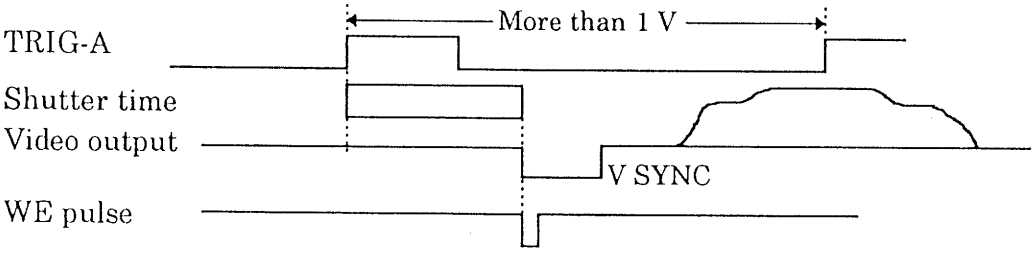
2T: Two trigger mode

Two trigger pulses are applied. Exposure starts at the TRIG-B rising edge and ends at the TRIG-A falling edge. The video output is obtained immediately after vertical sync reset. The interval between start and end equals the exposure time. Maximum exposure time is 1/30 second.



F: Fixed shutter mode

When a single trigger pulse (TRIG-A) is applied, exposure starts at the pulse rising edge. The exposure time is fixed and set by the camera electronic shutter switch. The video output is obtained immediately after exposure ends.



(17) Power supply voltage	12 ± 1 VDC
(18) Power consumption	Approx. 800mA
(19) Ambient, operating	0 to + 40 ℃, less than 90 % RH
Ambient, storage	-10 to + 50 ℃, less than 90 % RH
(20) Vibration endurance	3 G 10 to 60 Hz, amplitude 0.98 mm fixed 60 to 200 Hz, acceleration fixed, amplitude variable 10 to 200 Hz, 1 minute sweep, 30 minutes each in 3 directions
(21) Shock endurance	30 G (up, down, left, right once each)
(22) External dimensions	65 (W) X 75 (H) X 190 (D) mm
(23) Mass	Approx. 700 g

4. Composition

(1) Camera (with infrared blocking filter)
(2) Operating instructions

5. DC input, sync and data out connections

(1) Connections to DC IN and SYNC (12 pin connector)

Pin No.	Int. sync	Ext. sync			
		EXT HD/VD	Frame on demand		
			One trigger	Two trigger	Fixed shutter
1	GND	GND	GND	GND	GND
2	+12V	+12V	+12V	+12V	+12V
3	VIDEO (GND)	VIDEO (GND)	VIDEO (GND)	VIDEO (GND)	VIDEO (GND)
4	VIDEO (signal)	VIDEO (signal)	VIDEO (signal)	VIDEO (signal)	VIDEO (signal)
5	———	EXTHD (GND)	———	TRIG-B (GND)	———
6	———	EXTHD (signal)	———	TRIG-B (signal)	———
7	———	EXTVD (signal)	TRIG-A (signal)	TRIG-B (signal)	TRIG-A (signal)
8	———	———	———	———	WE (GND)
9	———	———	———	———	WE (signal)
10	GND	GND	GND	GND	GND
11	+12V	+12V	+12V	+12V	+12V
12	———	EXTVD (GND)	TRIG-A (GND)	TRIG-B (GND)	TRIG-A (GND)

Connector : Hirose HR10A-10R-12PB(01)

(2)Signal connections to D. OUT (50 pin)

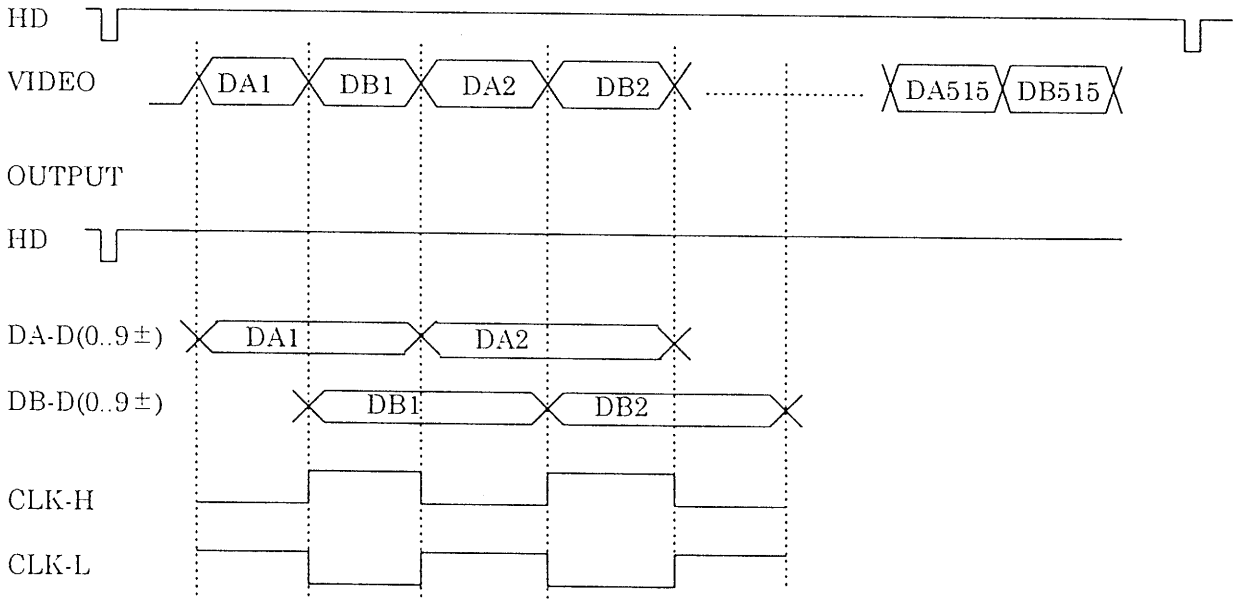
Connector: Hirose DX10G1M-50S

Pin No.	Signal name	Pin No.	Signal name	Pin No	Signal name	Pin No.	Signal name
1	DATA DB-D0(+)	2	DATA DB-D0(-)	26	DATA DA-D0(+)	27	DATA-DA-D0(-)
3	DATA DB-D1(+)	4	DATA DB-D1(-)	28	DATA DA-D1(+)	29	DATA-DA-D1(-)
5	DATA DB-D2(+)	6	DATA DB-D0(-)	30	DATA DA-D2(+)	31	DATA-DA-D2(-)
7	DATA DB-D3(+)	8	DATA DB-D0(-)	32	DATA DA-D3(+)	33	DATA-DA-D3(-)
9	DATA DB-D4(+)	10	DATA DB-D0(-)	34	DATA DA-D4(+)	35	DATA-DA-D4(-)
11	DATA DB-D5(+)	12	DATA DB-D0(-)	36	DATA DA-D5(+)	37	DATA-DA-D5(-)
13	DATA DB-D6(+)	14	DATA DB-D0(-)	38	DATA DA-D6(+)	39	DATA-DA-D6(-)
15	DATA DB-D7(+)	16	DATA DB-D0(-)	40	DATA DA-D7(+)	41	DATA-DA-D7(-)
17	DATA DB-D8(+)	18	DATA DB-D0(-)	42	DATA DA-D8(+)	43	DATA-DA-D8(-)
19	DATA DB-D9(+)	20	DATA DB-D0(-)	44	DATA DA-D9(+)	45	DATA-DA-D9(-)
21	GND ⚠	22	GND ⚠	46	CLK(+)	47	CLK(-)
23	GND	24	GND	48	VD(+)	49	VD(-)
25	HD(+)			50	HD(-)		

DATA DA, DB and CLK phase relationships

Parallel DA and DB outputs with respect to 1030 effective pixels of 1 horizontal line:

Total clock counts = 1440

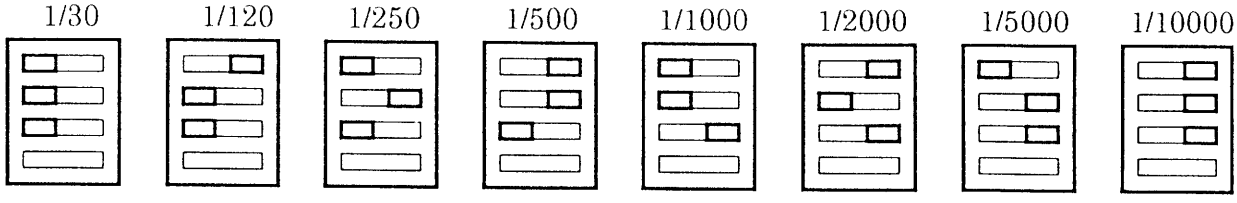


Connector: Hirose DX10G1M-50S

6. Rear panel switches

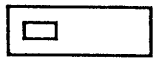
The rear panel includes switches for electronic shutter, and field on demand on/off and mode switches.

(1) Electronic shutter switches



Note: The bottom switch is spare and does not affect the setting.

(2) Frame on demand (FD) on/off switch

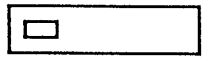

: OFF

OFF


: ON

ON

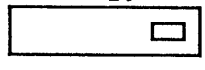
(3) Frame on demand mode switch


: One trigger

1T


: Two trigger

2T

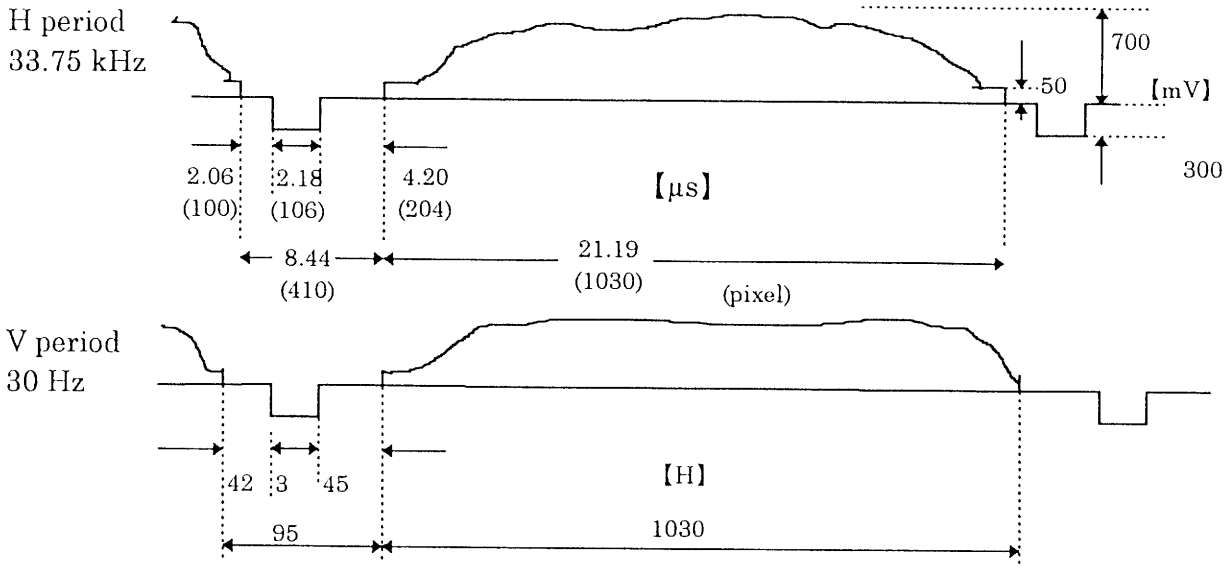

: Fixed shutter

F

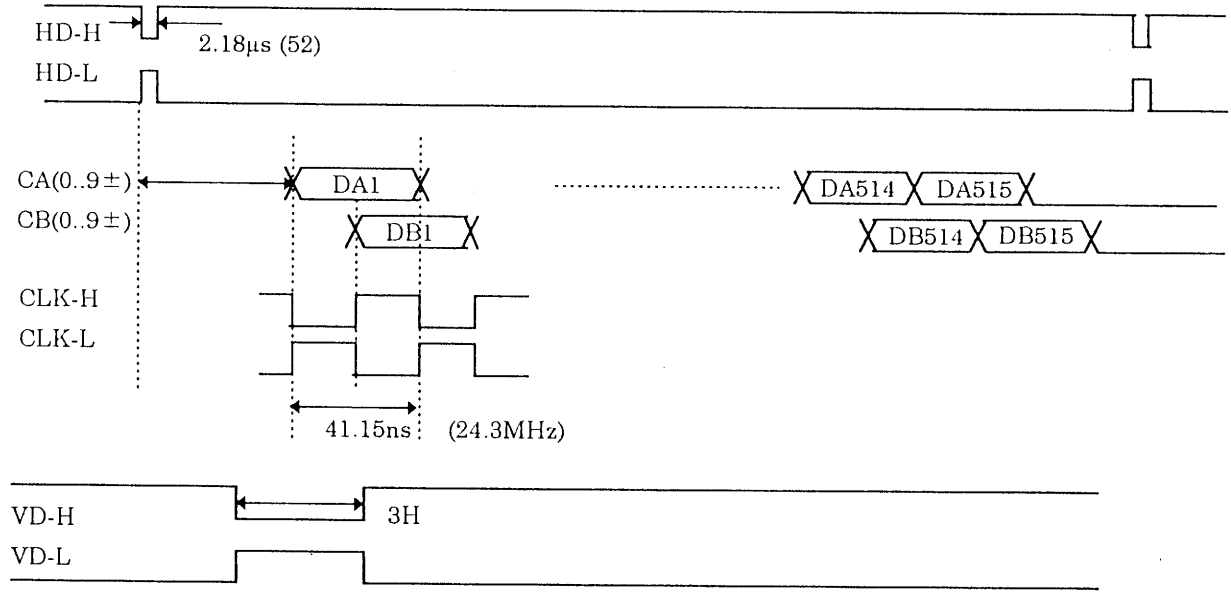
Effective only when on/off switch is on.

7. Input/output signal levels and timing

(1)Analog (VS) output signal

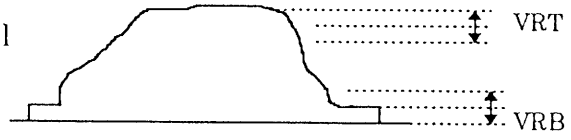


(2)Digital output (V period phase same as analog output)



Level: RS-422A rating (High: more than 3.4 V, Low: less than 0.4 V)

A/D converter digitizing level

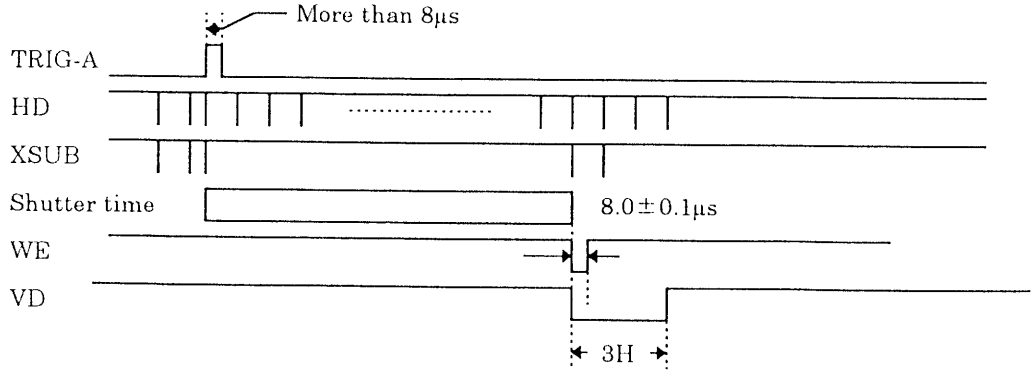


With respect to 700 mV rated level, clip at 800 mV
At factory: 80 mV to 720 mV digitized at 10 bits
Low level reference voltage (VRB) variable range: 0 to 160 mV
High level reference voltage (VRT) variable range: 640 to 800 mV

(3) WE output signal during fixed shutter mode

Level : TTL (High: more than 3.5 V, Low: less than 0.4 V)

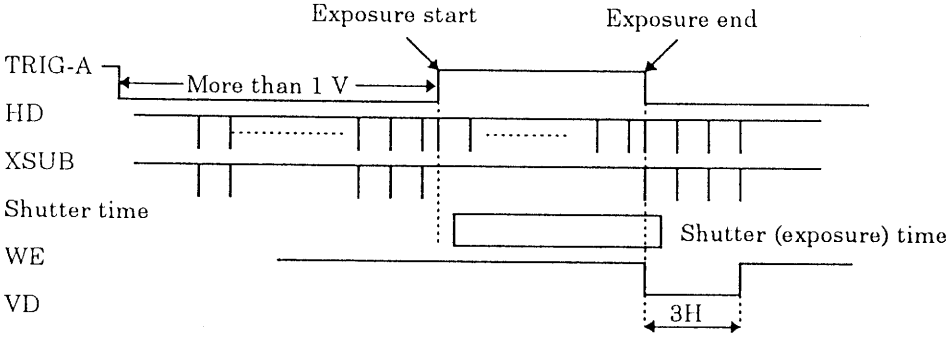
Phase More than 8 μ s



(See analog signal output phase of item 7-1.)

(4) TRIG-A input and HD & VD phase during One trigger mode

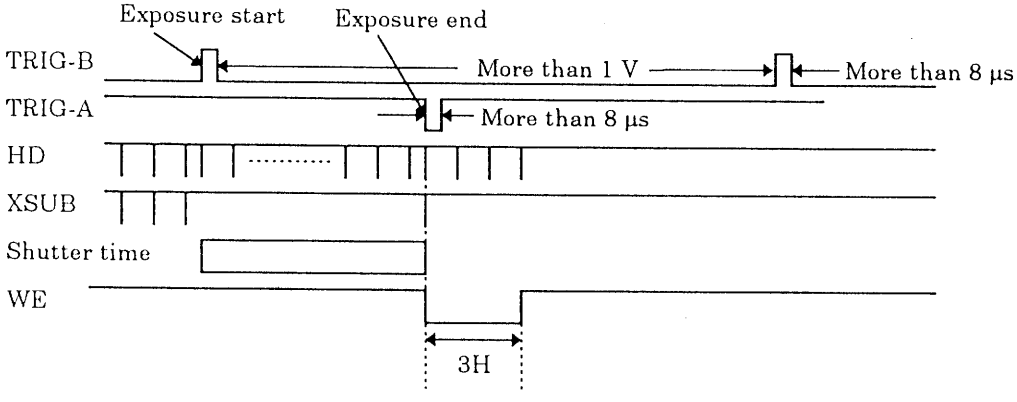
Transmit TRIG-A at CMOS level.



See analog signal output phase of item 7-1.)

(5) TRIG-A & B input phase and HD & VD phase during Two trigger mode

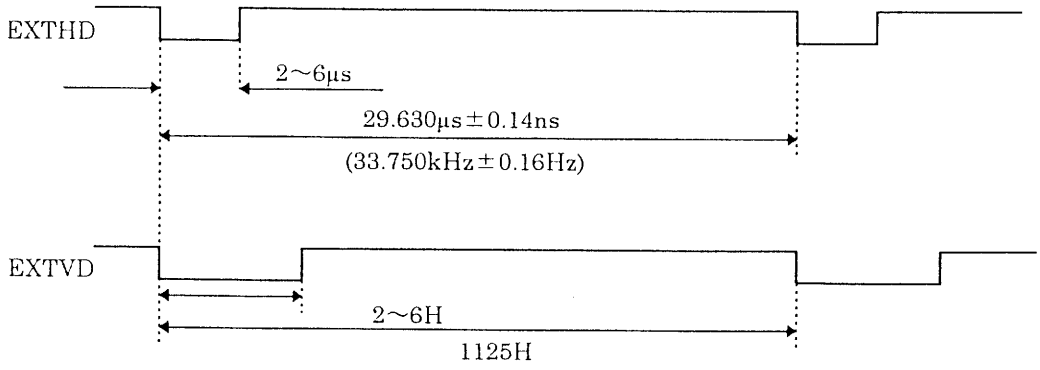
Transmit TRIG-A & B at CMOS level.



(See analog signal output phase of item 7-1.)

(6) External HD & VD input levels and phase

Level: 2 to 6 Vp-p



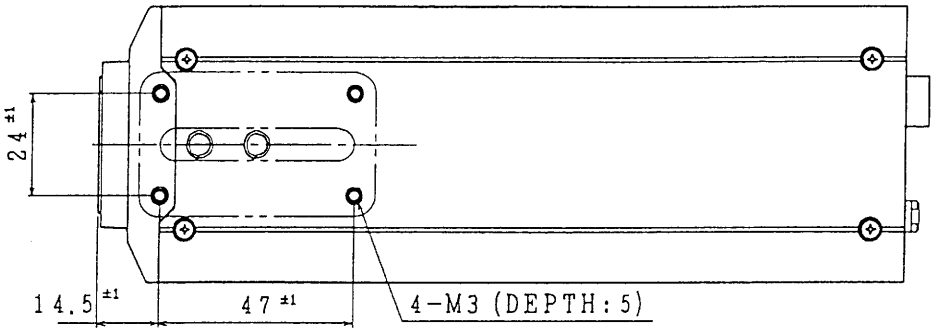
Align falling edges of external HD and VD.

Note : When operating the video signal at external HD & VD sync, use a crystal oscillator with a frequency of 48.6 MHz ± 50 ppm.

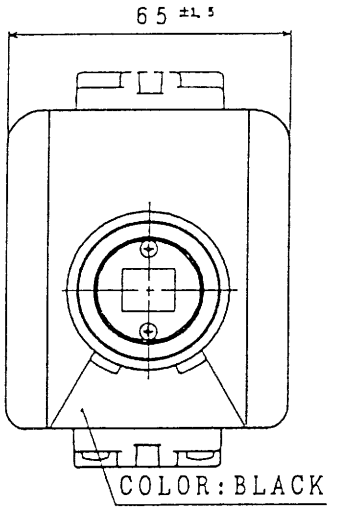
CCD CAMERA

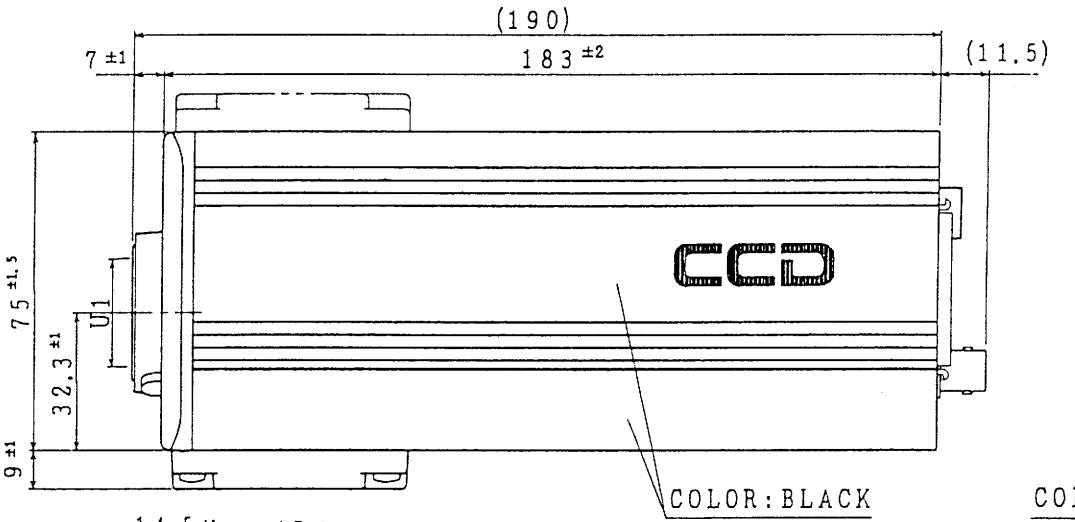
MODEL KP-F110

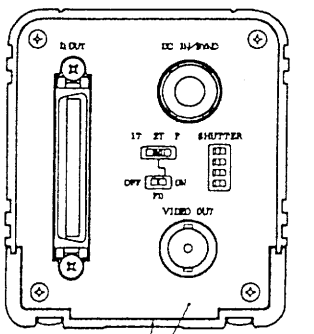
TENTATIVE

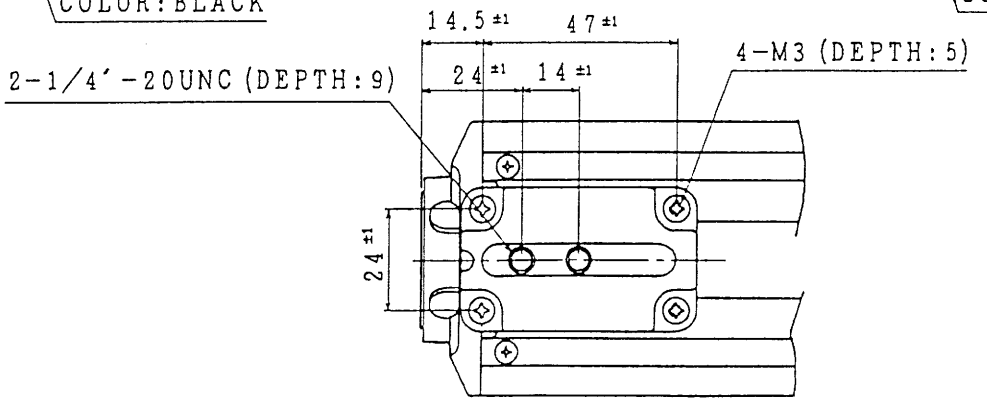


MASS:APPROX 700g









UNIT: mm

SCALE: NTS