

Progressive Scan CCD Color Camera

KP-FD30

Specifications

(Revision 1.1)

Hitachi Kokusai Electric Inc.

Jan 12, 2005

1. General

The KP-FD30 is a single CCD type RGB color camera which utilized the progressive scan CCD image sensor with square pixel for VGA format of 1 / 2-inch which adopted the RGB primary color mosaic filter.

The KP-FD30 is equipped with the progressive full frame RGB output of high frame rate(approx. 60 frame/second), the external synchronization(HD/VD), the external trigger function, etc., it is suitable for the image-processing equipment input.

2. Principal features

1) Suitable for the image-processing equipment input.

Small lightweight size, since adoption of multi-connector (picture signals, power supply, serial control signal, etc.) is connectable with one cable, it is the optimal as a microscope and an object for an image-processing equipment input.

2) High resolution and high color fidelity

By adoption of the progressive scan CCD image sensor and RGB primary color mosaic filters, the picture of high vertical resolution and high color fidelity can be acquired.

3) New digital signal processor (DSP)

The clear picture of a high signal to noise ratio (S/N) is obtained by the new digital signal processor (DSP) adoption which has improved luminance signal processings, such as 5H enhancer processing.

4) CCD drive functions

- a) Preset electronic shutter (settable 11 steps from 1/60 second to 1/50,000 second and 27 steps from 1/30 second to 8 second.)
- b) Variable electric shutter (1H steps from 1/60 second to Approx. 1/10,000 second)
- c) Auto electronic shutter[AES] (from 1/60 second to approx. 1/50,000 second)
- d) Frame/field on demand (one trigger and fixed shutter modes)

[**Only at the VGA mode**]

5) White balance

- a) Auto-tracking white balance (detecting white color in the scene at a color temperature form 2,500K to 6,000K)
- b) Preset white balance [AWC]
- c) Manual white balance. (R, B gain control)

6) External synchronization

As the external synchronization mode of HD/VD inputs system is available, the KP-FD30 is most suitable for system operation. The horizontal sync phase can be adjusting to the on-screen menu and remote control.

7) Output of NTSC system (2:1 interlace scan)

It can be set as the image output of NTSC system (2:1 interlace scan) by switch change.

8) Picture quality menus

A wide variety of modes and parameters can be selected from menus and adjusted by using rear panel key buttons.

9) Others.....

a) Video signal polarity (Selectable negative/positive)

b) Text display

c) Remote control (Via RS-232C)

3. Specifications

- 1) Imaging device : 1/2-inch progressive scan interline CCD
(with on-chip microlenses)
- Total number of pixels : 692(H) x 504(V)
No. of effective pixels : 659(H) x 494(V)
Scanning area : 6.52(H) x 4.89(V) mm
Unit cell size : 9.9(H) x 9.9(V) μ m (Square pixel)
Color filter : R, G, B primary color mosaic filters on chip
- 2) Scanning system : Progressive scan (VGA mode)
2:1 interlace scan (NTSC mode)
- 3) Frequency Horizontal : 31.468 kHz
Vertical : 59.94 Hz
- 4) Sync system : Internal / external (HD/VD auto selection)
- Internal sync output (D-sub 15pin MULTI connector)
- HD : 31.468 kHz (VGA mode)
15.734 kHz (NTSC mode)
2 Vp-p/75 Ω , Negative
- VD : 59.94 Hz 2 Vp-p/75 Ω Negative
- SYNC : 2 Vp-p/75 Ω , Negative
- WE : 5 Vp-p, Negative
- External sync input (D-sub 15pin MULTI connector)
- HD : 31.468 kHz (VGA mode)
15.734 kHz (NTSC mode)
2 to 5 Vp-p, Negative
- VD : 59.94 Hz 2 to 5 Vp-p, Negative
- EXT. Trigger input : Low 0 VDC, High 2 to 5 VDC [**Only at the VGA mode**]
- 5) Video signal output (D-sub 15pin MULTI connector)
- RGB output (D-sub 15pin MULTI connector)
- R : 0.7 Vp-p/75 Ω
G : 0.7 Vp-p/75 Ω
B : 0.7 Vp-p/75 Ω
- Y/C output (D-sub 15pin MULTI connector) [**Only at the NTSC mode**]
- Y : 1.0 Vp-p/75 Ω
C : 0.3 Vp-p(burst) /75 Ω
- VBS output (D-sub 15pin MULTI connector or BNC) [**Only at the NTSC mode**]
- VBS : 1.0 Vp-p/75 Ω
Subcarrier frequency : 3.579545 MHz \pm 100Hz

- 6) Video signal processing : Digital processing (input 10 bits)
- 7) S/N (Y signal) : More than 50dB (AGC, enhancer and gamma off)
- 8) Resolution (Y signal at center)
- Horizontal : 440 TV lines
 - Vertical : 480 TV lines (VGA mode)
350 TV lines (NTSC mode)
- 9) Standard sensitivity : 2,000 lx (F5.6, 100IRE)
- 10) Minimum illumination : 10 lx (F1.4, AGC ON, 50IRE)
- 11) Sensitivity selection : AGC OFF / ON
- Manual Gain Adjustable at AGC OFF
 - Limit Gain Adjustable at AGC ON
- 12) Electric shutter speed
- PRESET : Selectable in 11 steps high speed shutter
OFF(1/60), 1/100, 1/250, 1/500, 1/1000, 1/2000, 1/4000
1/10000, 1/20000, 1/30000, 1/50000 second
Selectable in 27 steps low speed shutter
OFF(1/60), 1/30, 1/15, 1/10, 1/7.5, 1/6, 1/5, 1/3.75, 1/3,
1/2.5, 1/2, 1/1.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5,
7, 7.5, 8 second
 - AES : From 1/60 second to approx. 1/50,000 second
(Response : SLOW, NORMAL, FAST)
 - VARIABLE : Approx. 1H steps from 1/60 second to 1/10,000 second
- 13) Ext. Trigger [**Only at the VGA mode**]
- a) One trigger mode
 - b) Fixed shutter mode
NORMAL(1/60), 1/250, 1/500, 1/1000, 1/2000, 1/4000
1/10000, 1/50000 second
- 14) Auto level control[ALC]
- (The auto level control system of AES, lens iris and AGC.)
- : AVERAGE / PEAK&AVERAGE / AREA
(Scanning area is selectable from 9 area.)
- 15) Auto-iris lens outputs
- Iris control voltage input (galvanometer) type lens
 - : Coupling coil impedance
 - Damper : 1,150 Ω \pm 10%
 - Drive : 190 Ω \pm 10%

- 16) White balance : Selectable in 3 modes
Auto-tracking[ATW] / preset[AWC] /
R/B gain manual control[MANUAL] /
- 17) Text display : 24 alpha-numeric characters in one line
- 18) Picture adjustment : Modes and settings can be selected and adjusted from
on-screen menu
- 19) Remote control : Modes and settings can be selected and adjusted
from PC.
RS-232C level, Connector: D-sub 15pin MULTI connector
- 20) Power supply : 12 VDC \pm 10 %
- 21) Power consumption : Approx. 360 mA
(Including 60mA for auto-iris lens)
- 22) Lens mount : C/CS mount (Flange-back adjustment)
- 23) Ambient temperature
Operating : -10 to +50 °C, 30 to 80 %RH
Storage : -20 to +60 °C, 20 to 90 %RH
Note : If operated continuously, be sure to use at less than +40 °C(104F)
for long term stable performance.
- 24) Vibration endurance : 68.65 m/s² (10 to 200Hz, 30 minutes each on XYZ axes)
Note : Do not subject to strong vibration for long periods of time.
- 25) Shock endurance : 490.3 m/s² (vertical, horizontal, once each face)
- 26) External dimensions : 58(W) x 58(H) x 48(D)
(not including lens and protrusions)
- 27) Mass : Approx. 220g (without lens)
- 28) Supplied equipment : Camera 1
Operating instructions 1
- 29) Optional accessories : DC input plug (R03-P3F)
Lens plug (E4-191J-100)
MULTI cable plug Housing (KEC-15P)
Pin contact (JK-SP2140)
Cover (JK-C151C)
Screw (No4-40UNC)

30) MULTI pin arrangement (D-sub 15pin)

Pin no.	Symbol	Signal name
1	R	R / C output
2	G	G / Y output
3	B	B / VBS output
4	WE	WE out
5	GND	Ground
6	GND(V)	Video ground
7	GND(V)	Video ground
8	GND(V)	Video ground
9	12V	UNREG +12V input
10	TRG	Trigger input
11	GND	Ground
12	RXD	Serial data input (RS-232C level)
13	HD	HD input / HD output / SYNC out
14	VD	VD input / VD output
15	TXD	Serial data output (RS-232C level)

31) Timing chart

External HD/VD mode

HD/VD inputs

HD: Negative polarity, 2 to 5 Vp-p

Frequency:

NTSC mode; 15,734 \pm 0.5Hz

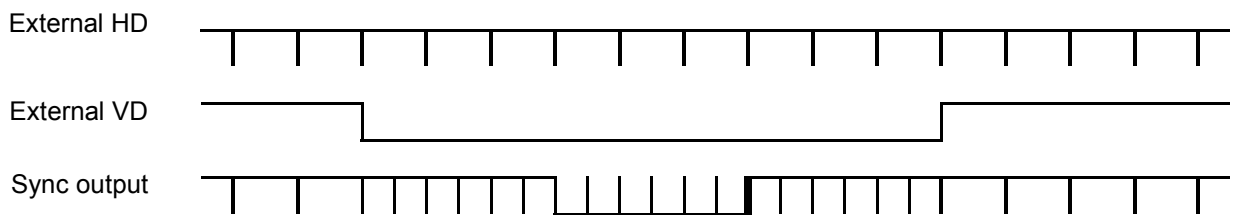
VGA mode; 31,468 \pm 0.5Hz

VD: Negative polarity, 2 to 5 Vp-p

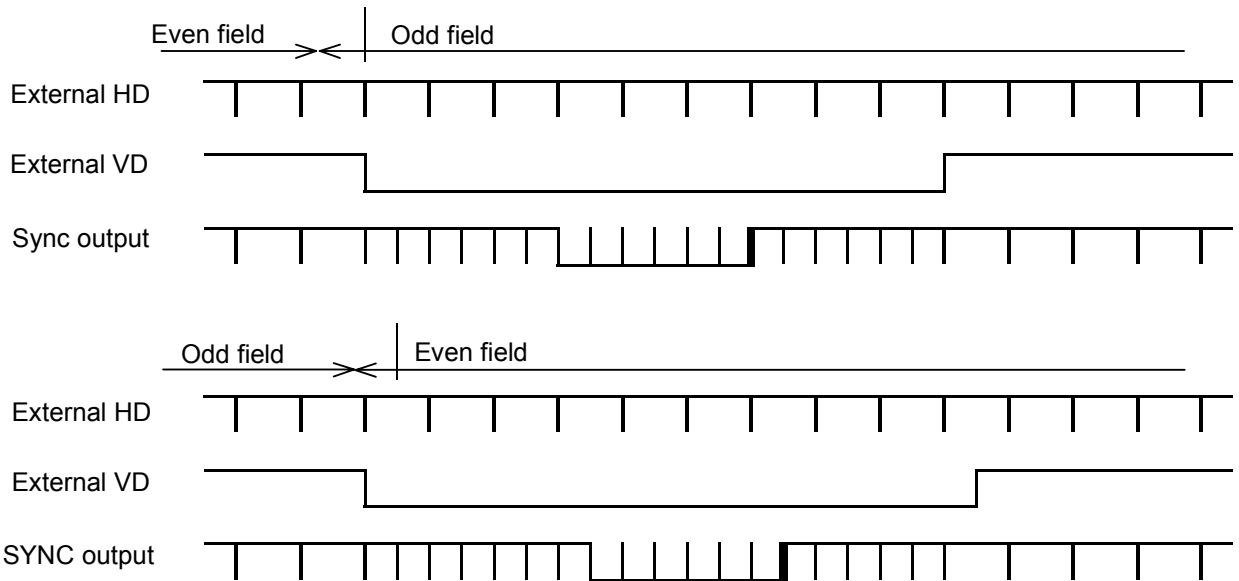
Frequency: 59.94Hz

Timing chart

(1) VGA mode



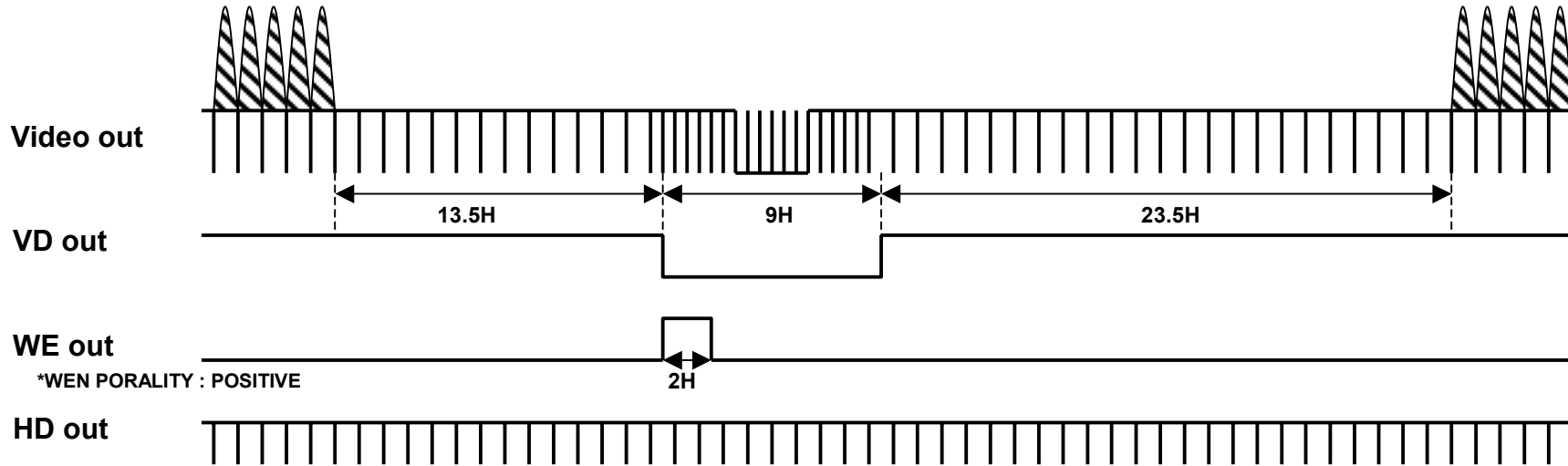
(2) NTSC mode



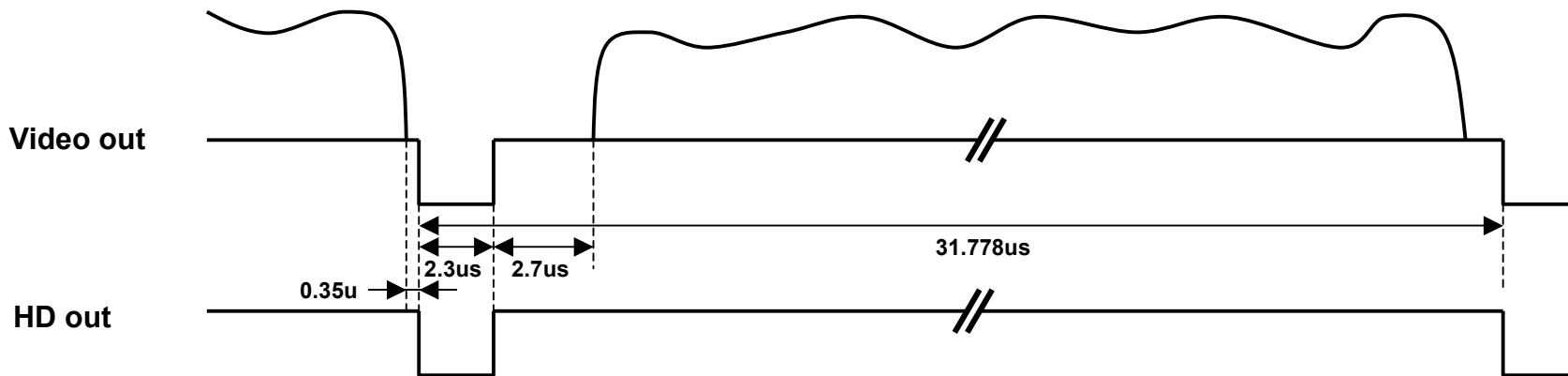
VGA mode timing chart

$1H = 31.468KHz = 31.778us$

Vertical



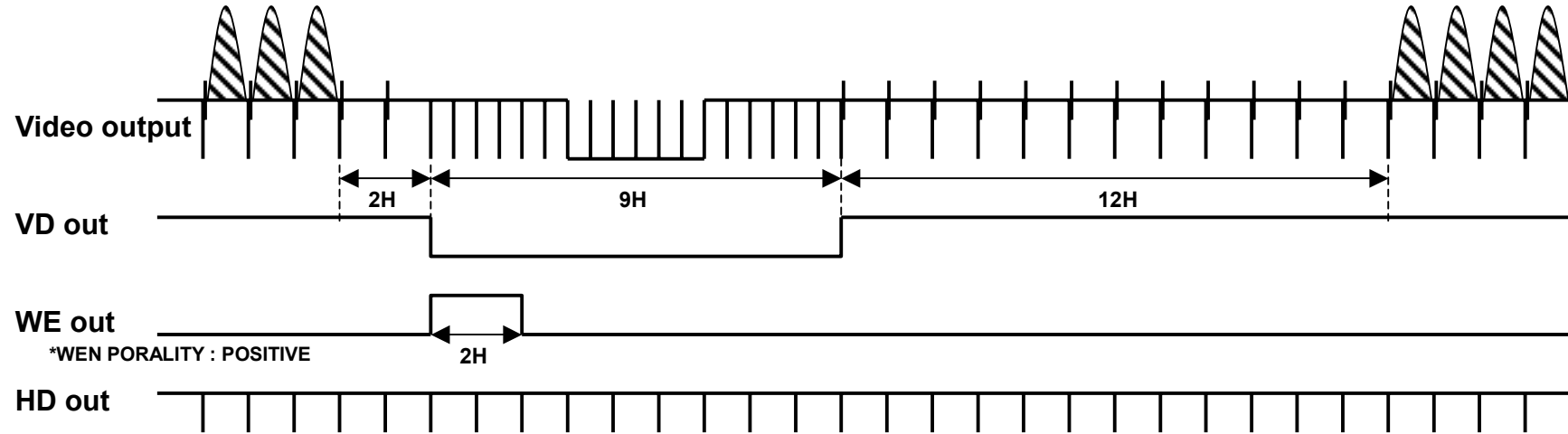
Horizontal



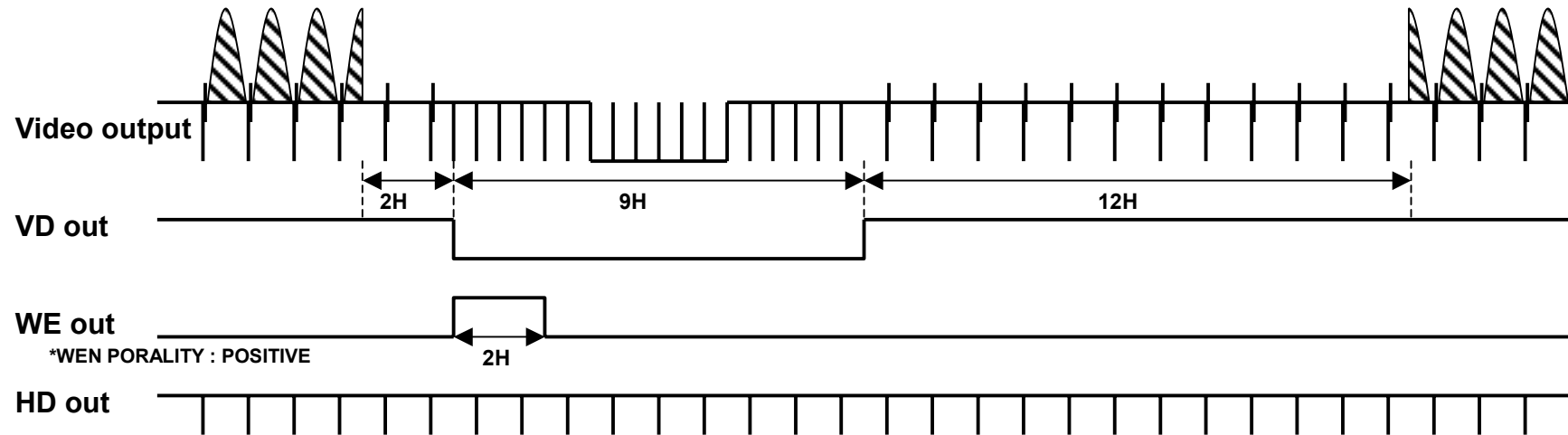
NTSC mode timing chart

Vertical ODD field

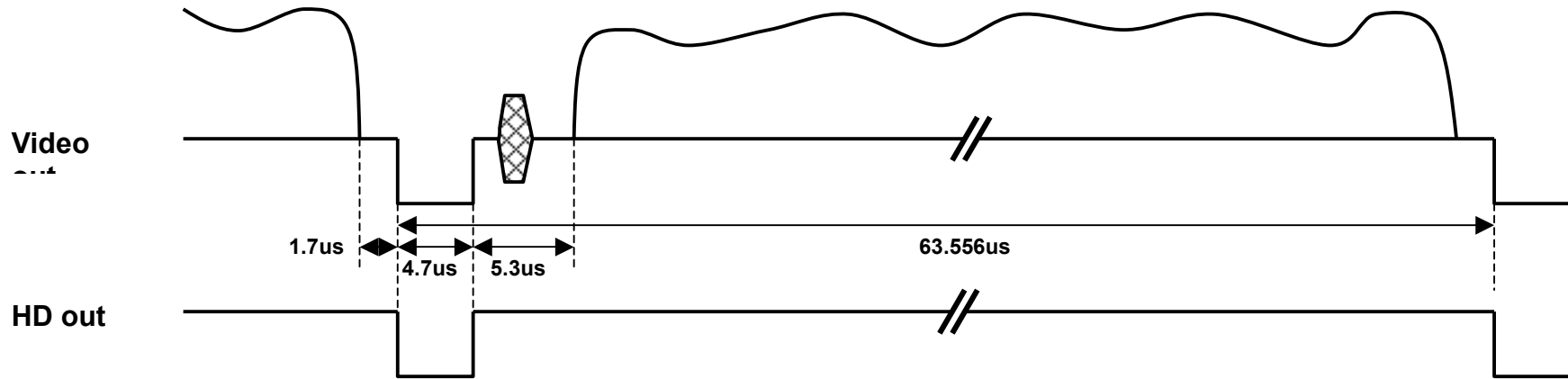
1H = 15.734KHz = 63.556us



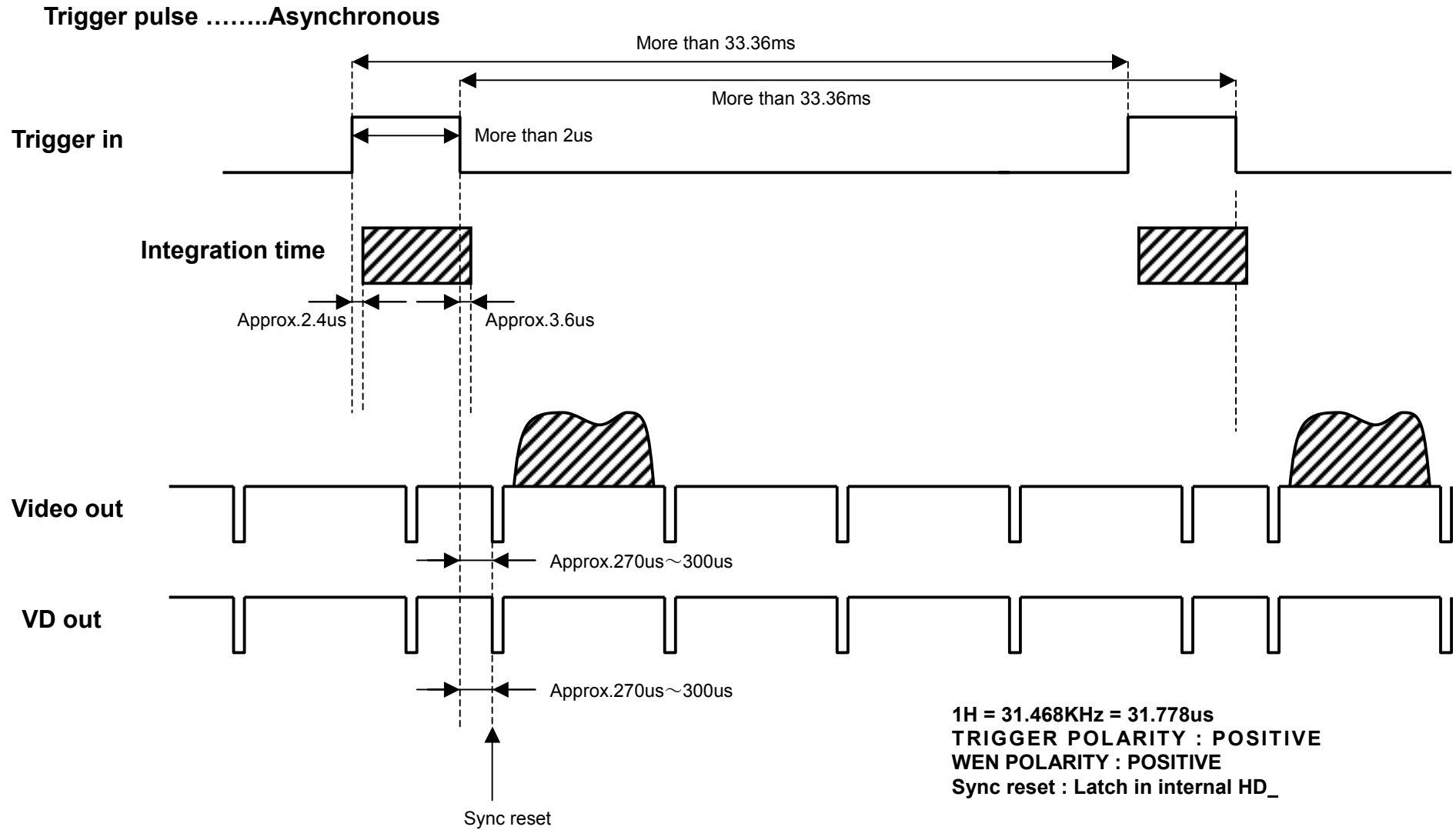
Vertical EVEN field



Horizontal

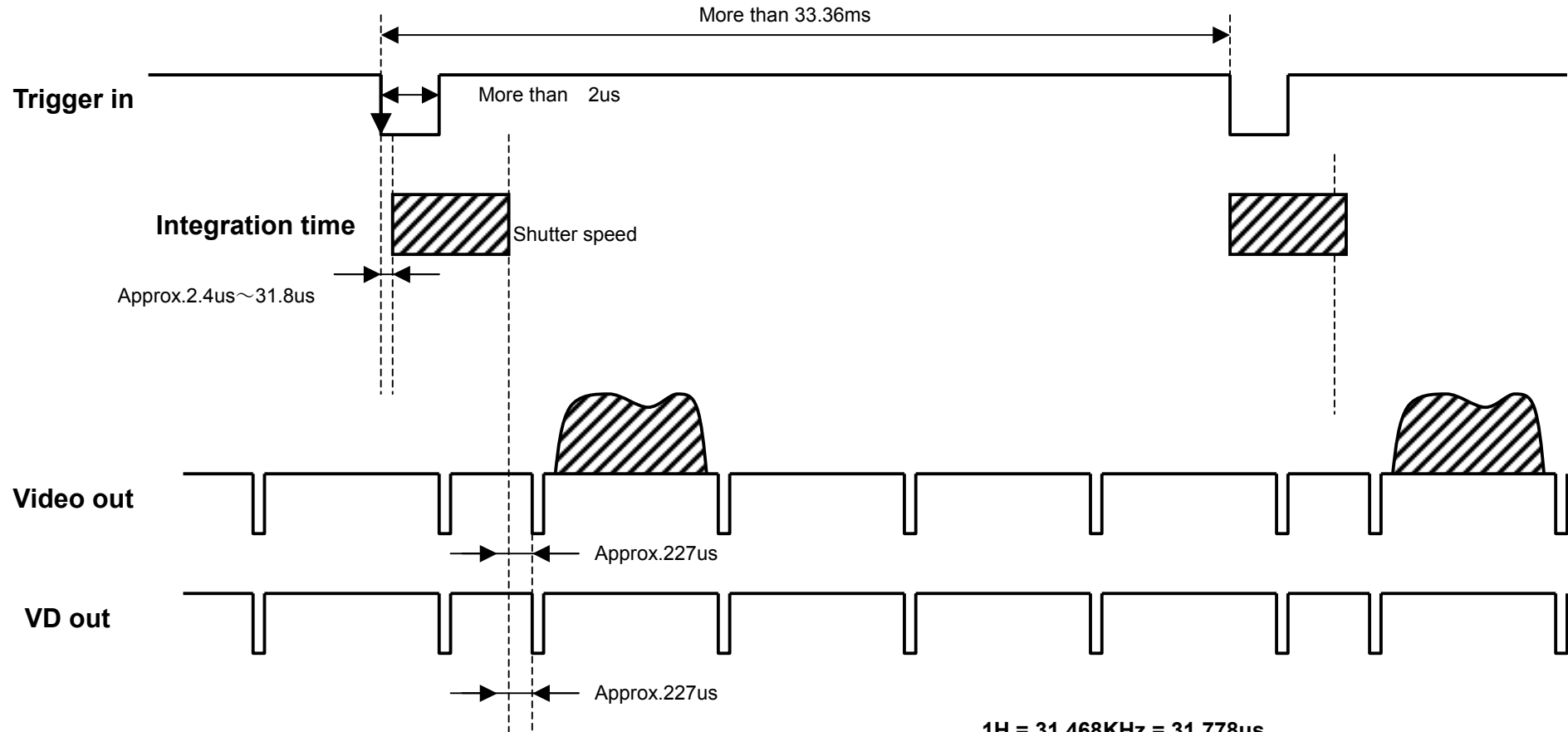


ONE trigger mode Timing chart



Fixed shutter mode Timing chart

Trigger pulse Latch in internal HD

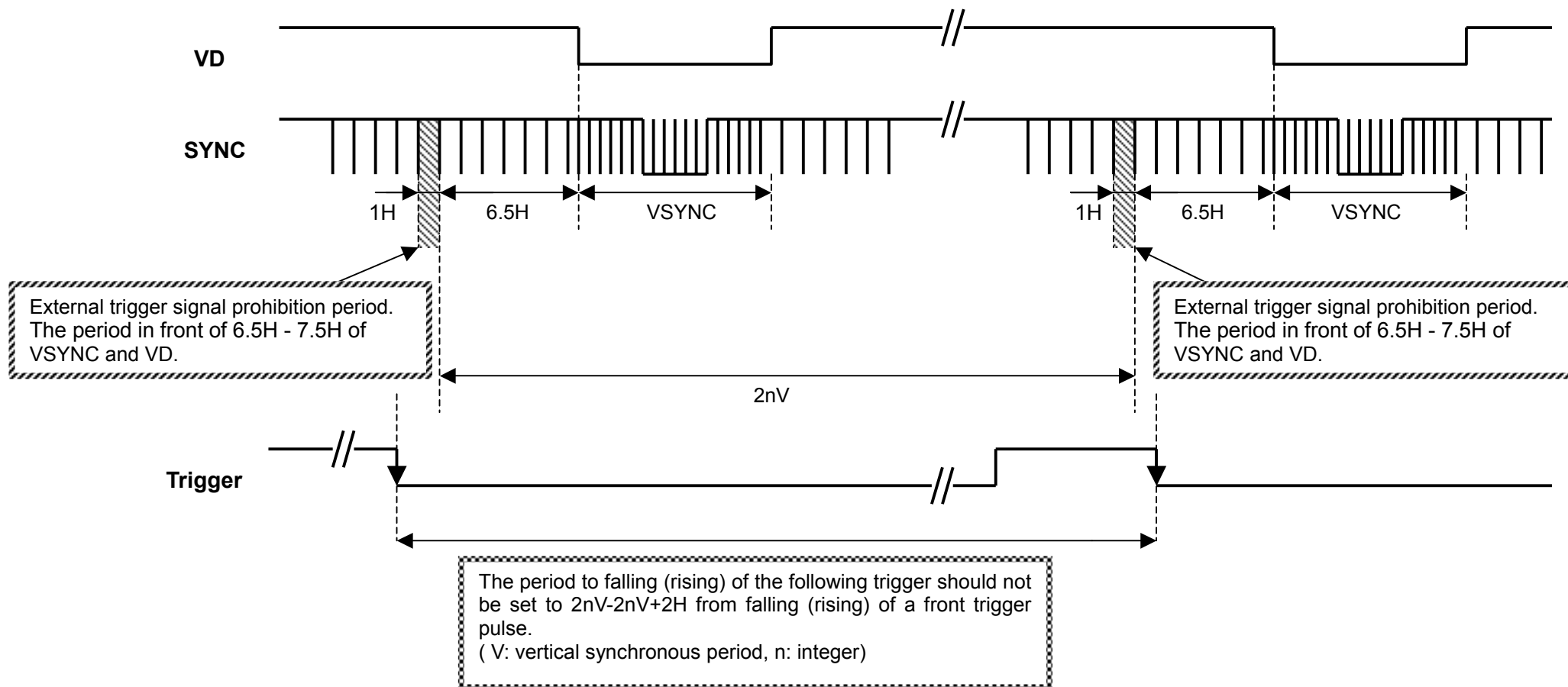


1H = 31.468KHz = 31.778us
TRIGGER POLARITY : POSITIVE
WEN POLARITY : NEGATIVE

(Important) About an external trigger signal prohibition period

When falling (rising) of a trigger pulse enters during the prohibition of the following figure, color reappearance may not be carried out correctly.

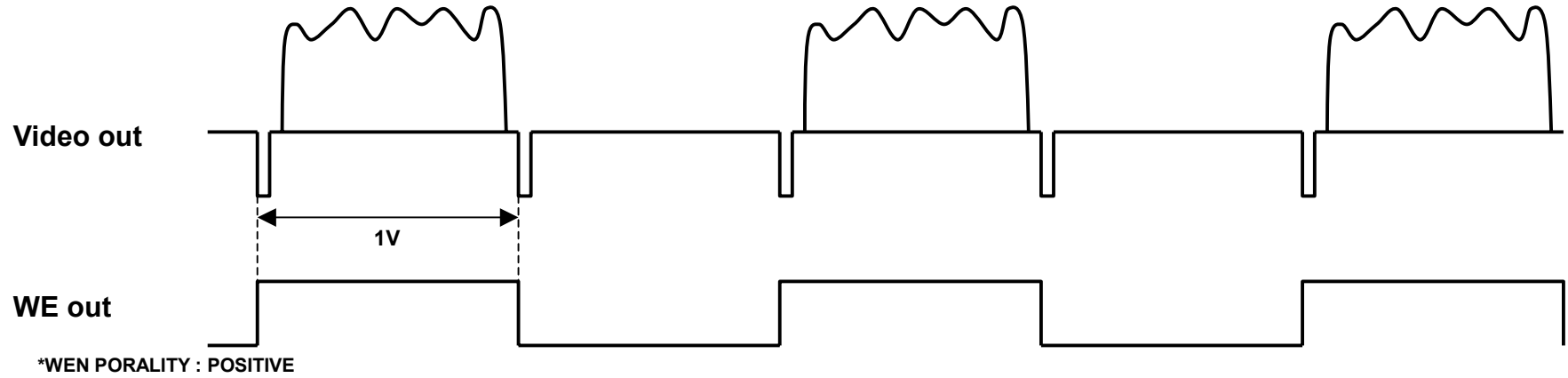
Please input the trigger pulse of the following specification not to input a trigger pulse during the prohibition.



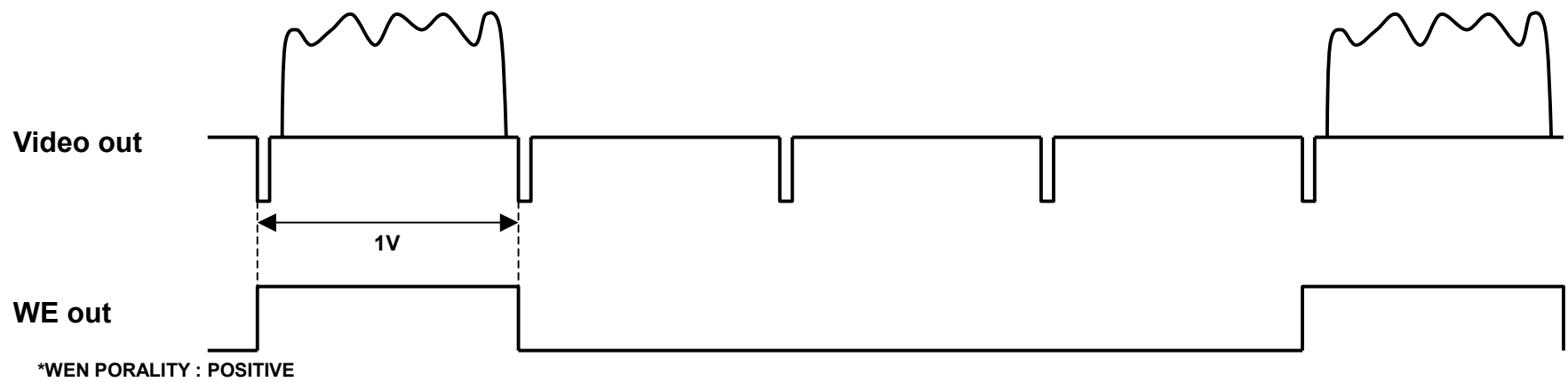
Slow shutter mode timing chart

Exp. Shutter speed : 1/30

1V = 59.94Hz = 16.683ms



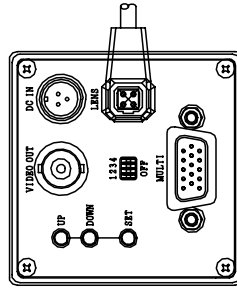
Exp. Shutter speed : 1/15



31) External view

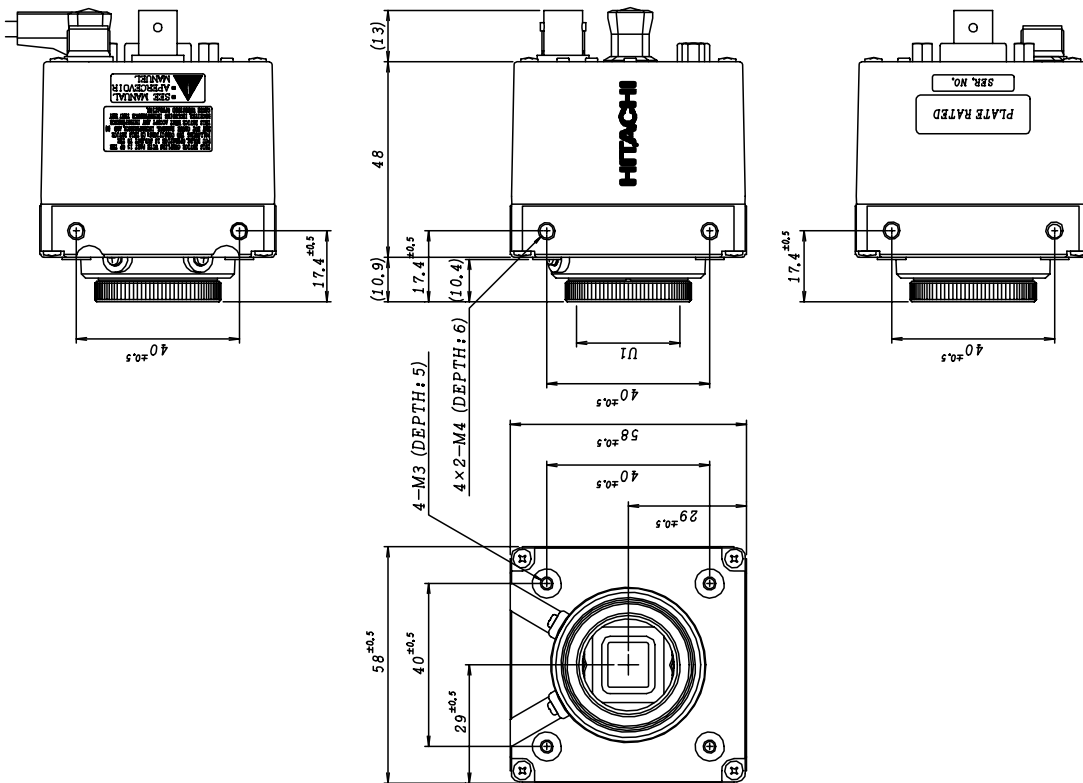
KP-FD30

MASS : APPROX. 220 g
 COLOR : BLACK



TENTATIVE

UNIT : mm



Notice:

These specifications are subject to change without prior notice due to product improvement. Confirm the most recent specifications at time of order.

Hitachi Kokusai Electric certifies this product complies with the standard warranty conditions of Hitachi Kokusai Electric, and that quality control is implemented to the extent required to comply with these conditions.

Warranty and service:

- 1) The guarantee period is one year after the data purchase. However, the defects due to erroneous use or intentional act are excluded.
- 2) As the defect after expiration of the guarantee period, where product repair is possible, repair will be performed at charge.
- 3) The present Warranty pertains only to the camera unit. Secondary malfunctions attributable to camera failure as well as expenses incurred by disassembly and reassembly of the related system, are beyond the scope of this Warranty.
- 4) Compensation for loss of business, loss or damage to software, database and other contingent losses are beyond the scope of this Warranty.
- 5) Hitachi Kokusai Electric Inc. is not liable for the losses caused when the equipment is used in a system, use for business trades, production process, medical fields, crime prevention applications, etc.
- 6) The parts used in the equipment have their respective lives. The lives of such parts will be shortened under the environments of high temperature or high humidity. When the stable operation is required for a long time, it is recommended to perform periodical maintenance and inspection every year or every two years.

Correction and change career

July 12, 2004 Revision 1.0 is issued.

Jan 12, 2005 Revision 1.1 is issued.

Reasons: Page 4, 3 1) The error in writing is corrected.

Scanning area ~~7.48(H)x6.15(V)mm~~→6.52(H)x4.89(V)mm