

NMOS multichannel detector head C8892

Integrated low-noise driver/amplifier circuit for NMOS linear image sensor



C8892 is multichannel detector head incorporating low-noise driver/amplifier circuit developed for Hamamatsu NMOS linear image sensors. C8892 is designed especially for compactness, having an overall length as short as 40 mm or less.

In addition, C8892 is designed for ease of use. It is provided with circular flange for connection to monochromator and adjustment mechanism for optical alignment for NMOS linear image sensor. The flange is interchangeable, thus facilitating connection to various models of monochromator. The housing case also provides a shielding effect against external noise. As useful options, peripheral devices are available for driving C8892, and for the output signal processing.

Features

- Low noise
- Wide dynamic range
- Operatable with simple input signals
(Only a master start pulse, a master clock pulse, ± 15 V are required.)
- Interchangeable flange
- Simple electrical and optical adjustments

Applications

- Multichannel spectrophotometry
- Optical spectrum analysis
- Time-resolved photometry

Compatible NMOS linear image sensors

| Type No. of NMOS linear image sensor *1 | Number of pixels | Active area per pixel (pixel pitch × height) |
|---|------------------|--|
| S3901-128Q, S8380-128Q | 128 | 50 μ m × 2.5 mm |
| S3901-256Q/F, S8380-256Q | 256 | |
| S3901-512Q/F, S8380-512Q | 512 | |
| S3902-128Q | 128 | 50 μ m × 0.5 mm |
| S3902-256Q/F | 256 | |
| S3902-512Q/F | 512 | |
| S3903-256Q | 256 | 25 μ m × 0.5 mm |
| S3903-512Q/F | 512 | |
| S3903-1024Q/F | 1024 | |
| S3904-256Q, S8381-256Q | 256 | 25 μ m × 2.5 mm |
| S3904-512Q/F, S8381-512Q | 512 | |
| S3904-1024Q/F, S8381-1024Q | 1024 | |

*1: The suffix of type number indicates:
Q: quartz window, F: fiber optic window

■ Absolute maximum ratings

| Parameter | Symbol | Value | Unit |
|-------------------------|--------|--------------|------|
| Supply voltage (analog) | Va | ±18 | V |
| Operating temperature | Topr | 0 to 50 *2 | °C |
| Storage temperature | Tstg | -10 to 60 *2 | °C |

*2: No condensation

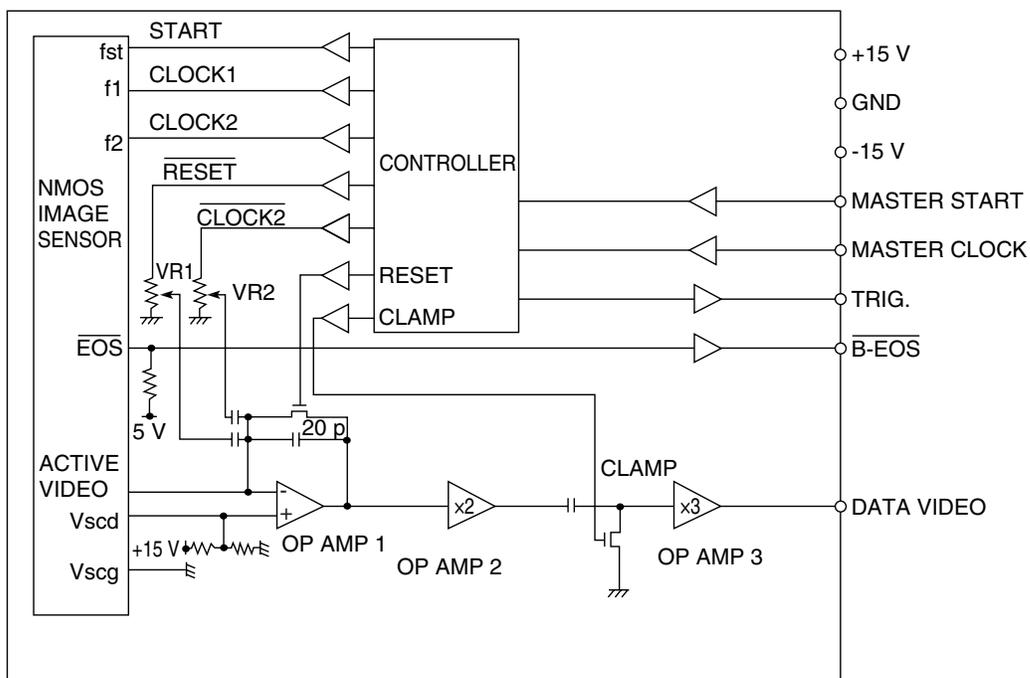
■ Electrical characteristics (Ta=25 °C)

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | |
|-------------------|--------------------------|----------------|--------------|--------|--------|-------|-----|
| Input | Supply voltage | Analog | Va | ±14.5 | ±15.0 | ±15.5 | V |
| | Master start pulse (φms) | Voltage | Vms (H) | 2.0 | 5.0 | - | V |
| | | | Vms (L) | 0 | - | 0.8 | |
| | | Width | tpwφms | 1/fφmc | - | - | s |
| | Rise/fall Time | trφms, tfφms | - | - | 500 | ns | |
| | Master clock pulse (φmc) | Voltage | Vmc (H) | 2.0 | 5.0 | - | V |
| | | | Vmc (L) | 0 | - | 0.8 | |
| | | Frequency | fφmc | - | - | 375 | kHz |
| | | Width *3 | tpwφmc | 30 | - | - | ns |
| | Rise/fall time | trφmc, tfφmc | - | - | 500 | ns | |
| Output *4 | Start pulse (φst) | Voltage | Vst (H) | 4.75 | 5.0 | - | V |
| | | | Vst (L) | 0 | - | 0.4 | |
| | | Rise/fall time | trφst, tfφst | - | - | 100 | ns |
| | Width | tpwφst | - | 2/fφmc | - | s | |
| | Clock pulse (φ1, φ2) | Voltage | V1, V2 (H) | 4.75 | 5.0 | - | V |
| | | | V1, V2 (L) | 0 | - | 0.4 | |
| | Rise/fall time | trφ1, trφ2 | - | - | 100 | ns | |
| | tfφ1, tfφ2 | - | - | 100 | | | |
| | Clock pulse (φ1) width | | tpwφ1 | - | 3/fφmc | - | s |
| | Clock pulse (φ2) width | | tpwφ2 | - | 3/fφmc | - | s |
| End of scan pulse | Voltage | Veos (H) | 4.75 | 5.0 | - | V | |
| | | Veos (L) | - | - | 0.4 | | |
| | Rise/fall time | treos, tfeos | - | - | 100 | ns | |
| Width | | tpweos | - | 3/fφmc | - | s | |
| Trigger pulse | Voltage | Vtrig (H) | 4.0 | 5.0 | - | V | |
| | | Vtrig (L) | 0 | - | 0.4 | | |
| Rise/fall time | | trtrig, tftrig | - | - | 100 | ns | |

*3: The operation of 50 % Typ. duty ratio is recommended.

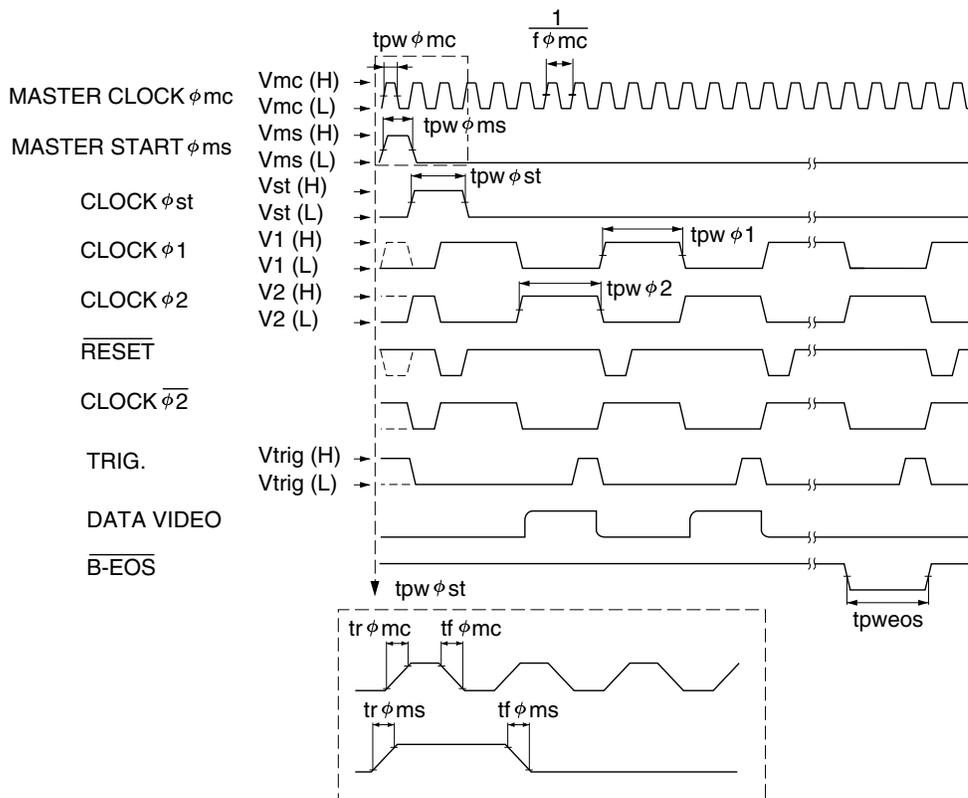
*4: The outputs of start-pulse and clock-pulse are to be obtained from a front part where an image sensor is installed. The outputs of end-of-scan and trigger-pulse are to be obtained from a back-side part where a connector for input/output signal is fixed.

■ Block diagram



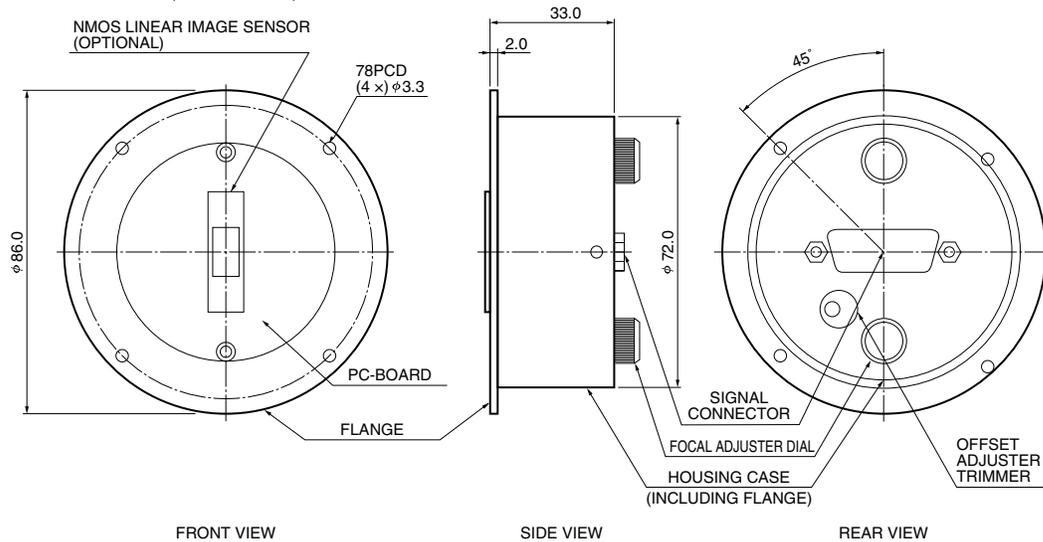
KACCC0171EA

■ Timing chart



KACCC0172EA

■ Dimensional outline (unit: mm)

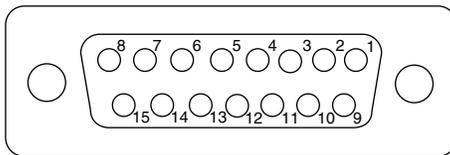


The focal position can be adjusted backward within the range from 0 to 4.5 mm (circuit stroke length) with a focal adjustment dial.

WEIGHT: approx. 0.16 kg

KACCA0113EA

■ Pin assignment of "Signal I/O" connector (15-pin D-sub socket type)



KACCC0069EA

| Terminal No. | Terminal name | Description |
|--------------|---------------|---|
| 1 | NC | No connection |
| 2 | Data video | Analog video signal output; positive polarity |
| 3 | +15 V | Positive power supply (25 mA) |
| 4 | -15 V | Negative power supply (15 mA) |
| 5 | NC | No connection |
| 6 | Start | Digital input signal for initializing the circuit; positive logic. Interval of these pulses equals the integration time of the sensor |
| 7 | CLK | Digital input signal for operating the circuit at the rising edge |
| 8 | EOS | Digital output signal indicating end of scan, negative logic |
| 9 | A. GND | Analog ground |
| 10 | A. GND | Analog ground |
| 11 | Shield | Case shield |
| 12 | D. GND | Digital ground |
| 13 | D. GND | Digital ground |
| 14 | D. GND | Digital ground |
| 15 | Trigger | Digital output signal for A/D conversion; positive logic |

- Video data rate is 1/6 of master clock frequency (62.5 kHz Max.).
- The operation of circuit stroke length below 4.5 mm is recommended.
- The relation between data video output voltage and output charges from NMOS image sensor can be expressed by the following formula.

$$V_{out} (V) = 3 \times \frac{\text{Output charge}}{10 \times 10^{-12} [F]}$$

Note) Amplifier saturation voltage is 10 V.

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