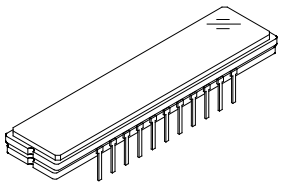
SONY

# ILX505A

## 2592-pixel CCD Linear Image Sensor (B/W)

22 pin DIP (Ceramic)



### Description

The ILX505A is a reduction type CCD linear sensor designed for facsimile, image scanner and OCR use. This sensor reads A3 size documents at a density of 200 DPI (Dot Per Inch). A built-in timing generator and clock-drivers ensure direct drive at 5V logic for easy use.

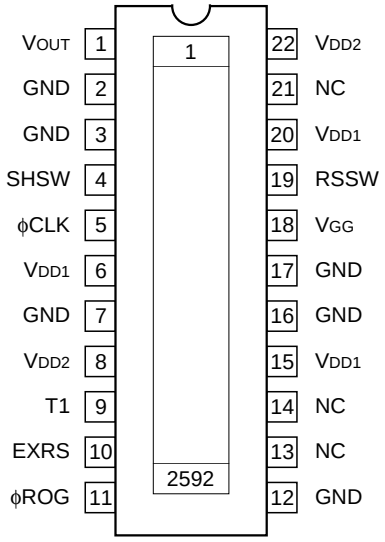
### Features

- Number of effective pixels: 2592 pixels
- Pixel size: 11µm × 11µm (11µm pitch)
- Built-in timing generator and clock-drivers
- Ultra low lag
- High sensitivity
- Maximum clock frequency: 5MHz

### Absolute Maximum Ratings

| | | | |
|---|---|---|---|
| • Supply voltage | $V_{DD1}$ | 11 | V |
| | $V_{DD2}$ | 6 | V |
| • Operating temperature | | –10 to +55 | °C |
| • Storage temperature | | –30 to +80 | °C |

### Pin Configuration (Top View)

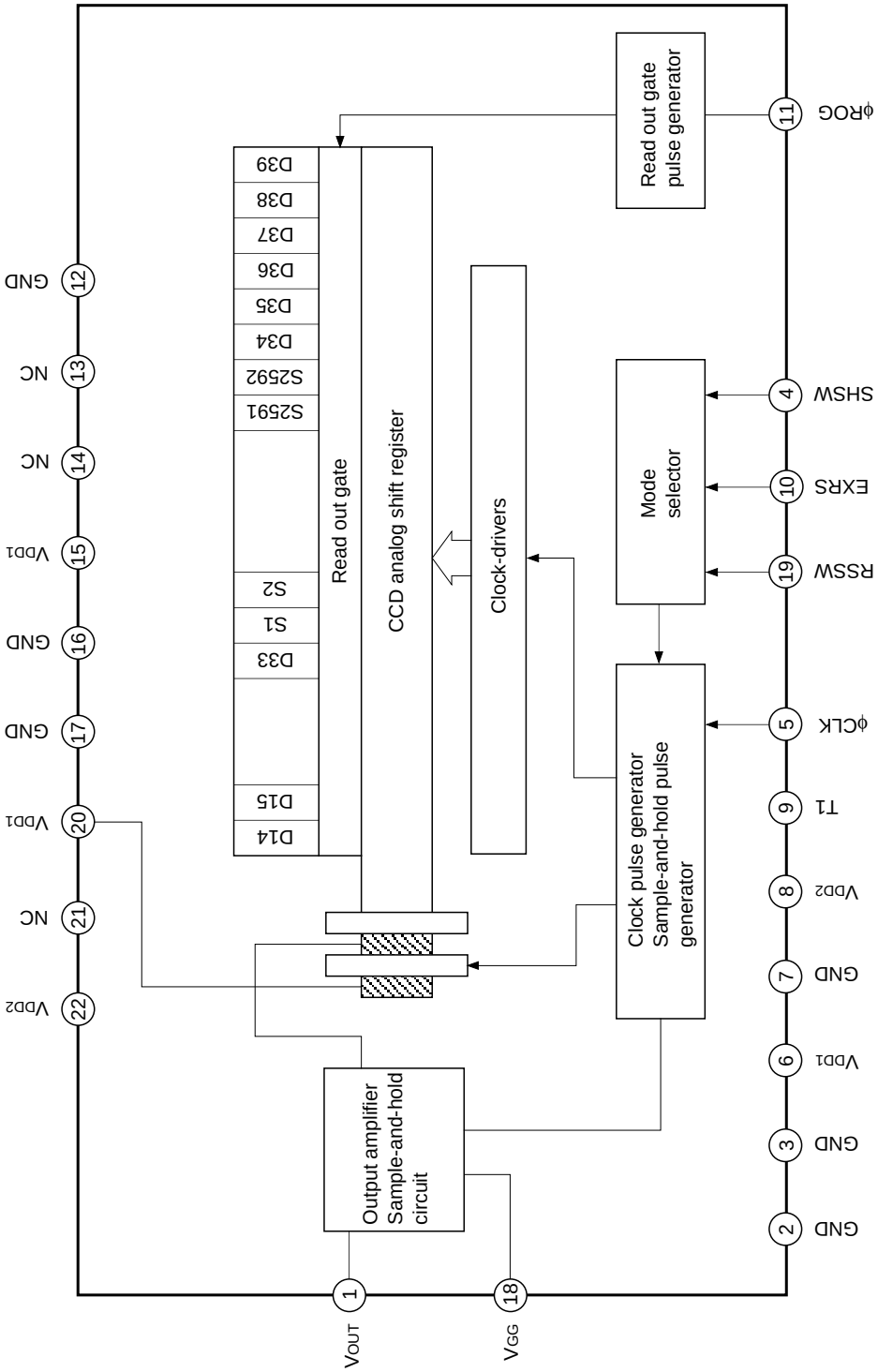







E92Y22D78-PS

## Block Diagram



**Pin Description**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | $V_{OUT}$ | Signal output |
| 2 | GND | GND |
| 3 | GND | GND |
| 4 | SHSW | Switch { with S/H → GND / without S/H → $V_{DD2}$ |
| 5 | ϕCLK | Clock pulse |
| 6 | $V_{DD1}$ | 9V power supply |
| 7 | GND | GND |
| 8 | $V_{DD2}$ | 5V power supply |
| 9 | T1 | Test pin ($V_{DD2}$) |
| 10 | EXRS | External RS pulse input. Must be connected to $V_{DD2}$ when the internal RS pulse is used. |
| 11 | ϕROG | Clock pulse |
| 12 | GND | GND |
| 13 | NC | NC |
| 14 | NC | NC |
| 15 | $V_{DD1}$ | 9V power supply |
| 16 | GND | GND |
| 17 | GND | GND |
| 18 | $V_{GG}$ | Output circuit gate bias |
| 19 | RSSW | Reset pulse switchover pin |
| 20 | $V_{DD1}$ | 9V power supply |
| 21 | NC | NC |
| 22 | $V_{DD2}$ | 5V power supply |

**Mode Description**

| Mode in Use | 19 pin RSSW | 10 pin EXRS |
|---|---|---|
| Internal RS | GND | $V_{DD2}$ |
| Externel RS | $V_{DD2}$ | $\phi$RS |

**Note)** When the external RS mode is in use, operation of use internal S/H is not guaranteed. Pin 4 must be connected to 5V DC power supply.

**Recommended Voltage**

| Item | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| $V_{DD1}$ | 8.5 | 9.0 | 9.5 | V |
| $V_{DD2}$ | 4.75 | 5.0 | 5.25 | V |

**Note)** Rules for raising and lowering power supply voltage
To raise power supply voltage, first raise $V_{DD1}$ (9V) and then $V_{DD2}$ (5V).
To lower voltage, first lower $V_{DD2}$ (5V) and then $V_{DD1}$ (9V).

**Electro-optical Characteristics**

(Ta = 25°C, $V_{DD1}$ = 9V, $V_{DD2}$ = 5V, Clock frequency: 1MHz,
Light source = 3200K, IR cut filter: CM-500S (t = 1.0mm)),
When Internal RS (Pin 19 = GND, Pin 10 = $V_{DD2}$)

| Item | Symbol | Min. | Typ. | Max. | Unit | Remarks |
|---|---|---|---|---|---|---|
| Sensitivity 1 | R1 | 16.8 | 21 | 25.2 | V/(lx · s) | Note 1 |
| Sensitivity 2 | R2 | — | 53 | — | V/(lx · s) | Note 2 |
| Sensitivity nonuniformity | PRNU | — | 2.0 | 8.0 | % | Note 3 |
| Saturation output voltage | $V_{SAT}$ | 1.5 | 1.8 | — | V | — |
| Dark voltage average | $V_{DRK}$ | — | 0.3 | 2.0 | mV | Note 4 |
| Dark signal nonuniformity | DSNU | — | 0.5 | 3.0 | mV | Note 4 |
| Image lag | IL | — | 0.02 | — | % | Note 5 |
| Dynamic range | DR | — | 6000 | — | — | Note 6 |
| Saturation exposure | SE | — | 0.085 | — | lx · s | Note 7 |
| 9V supply current | $I_{VDD1}$ | — | 14.0 | 20.0 | mA | — |
| 5V supply current | $I_{VDD2}$ | — | 5.0 | 10.0 | mA | — |
| Total transfer efficiency | TTE | 92.0 | 97.0 | — | % | — |
| Output impedance | $Z_O$ | — | 600 | — | Ω | — |
| Offset level | $V_{OS}$ | — | 4.5 | — | V | Note 8 |

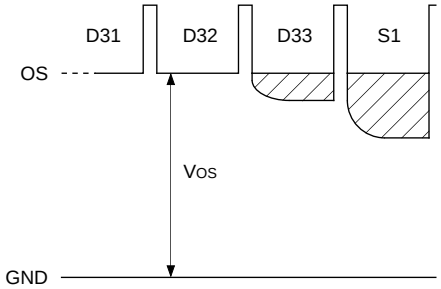
**Notes)**

1) For the sensitivity test light is applied with a uniform intensity of illumination.
2) W lamp (2854K)
3) PRNU is defined as indicated below. Ray incidence conditions are the same as for Note 1.

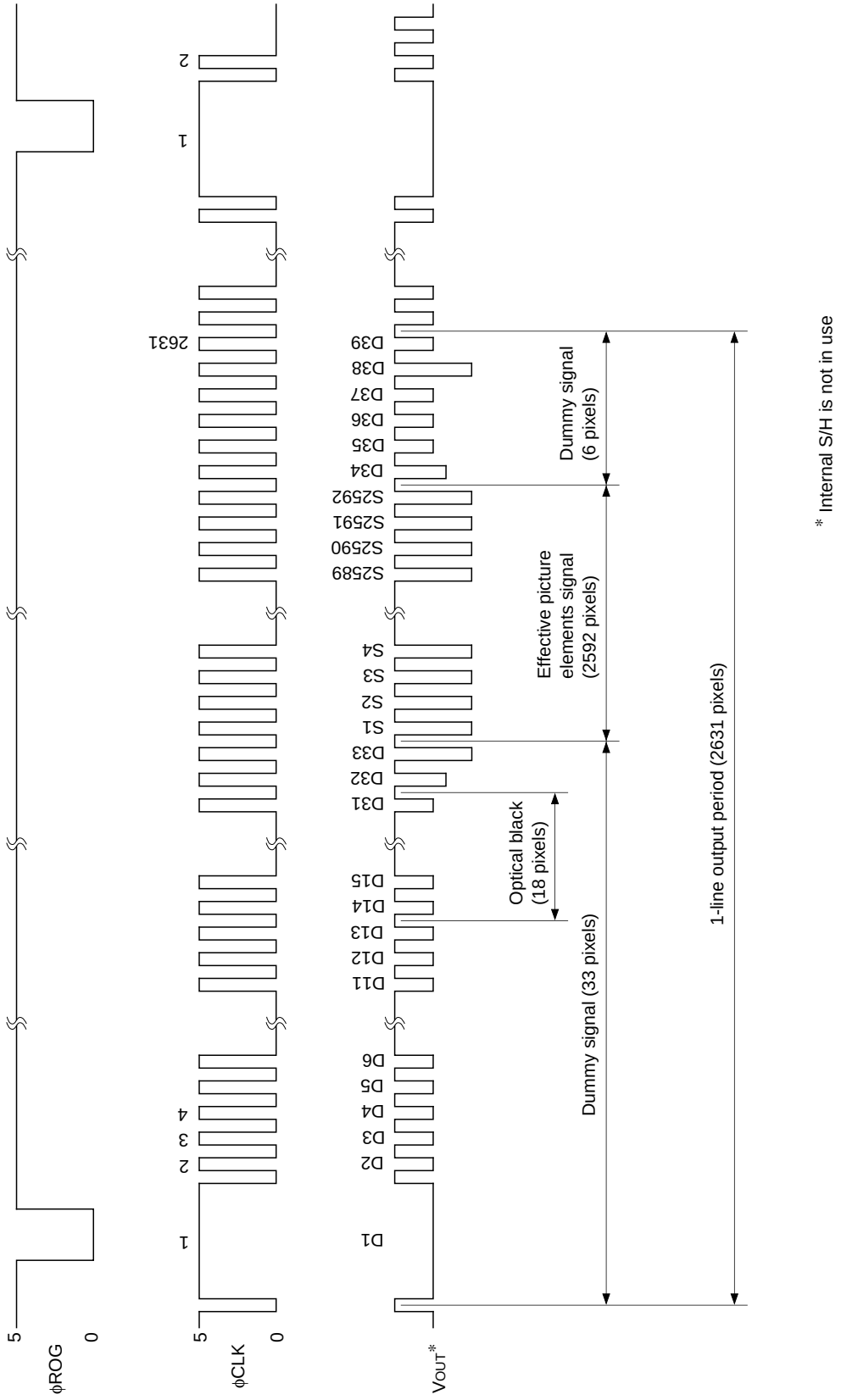
$$PRNU = \frac{(V_{MAX} - V_{MIN})/2}{V_{AVE}} \times 100\ [\%]$$

The maximum output of all the valid pixels is set to $V_{MAX}$, the minimum output to $V_{MIN}$ and the average output to $V_{AVE}$.

4) Integration time is 10ms.
5) $V_{OUT}$ = 500mV
6) DR = $V_{SAT}/V_{DRK}$
7) SE = $V_{SAT}/R1$
8) $V_{OS}$ is defined as indicated below.
Signal is observed at PNP-type emitter follower out.

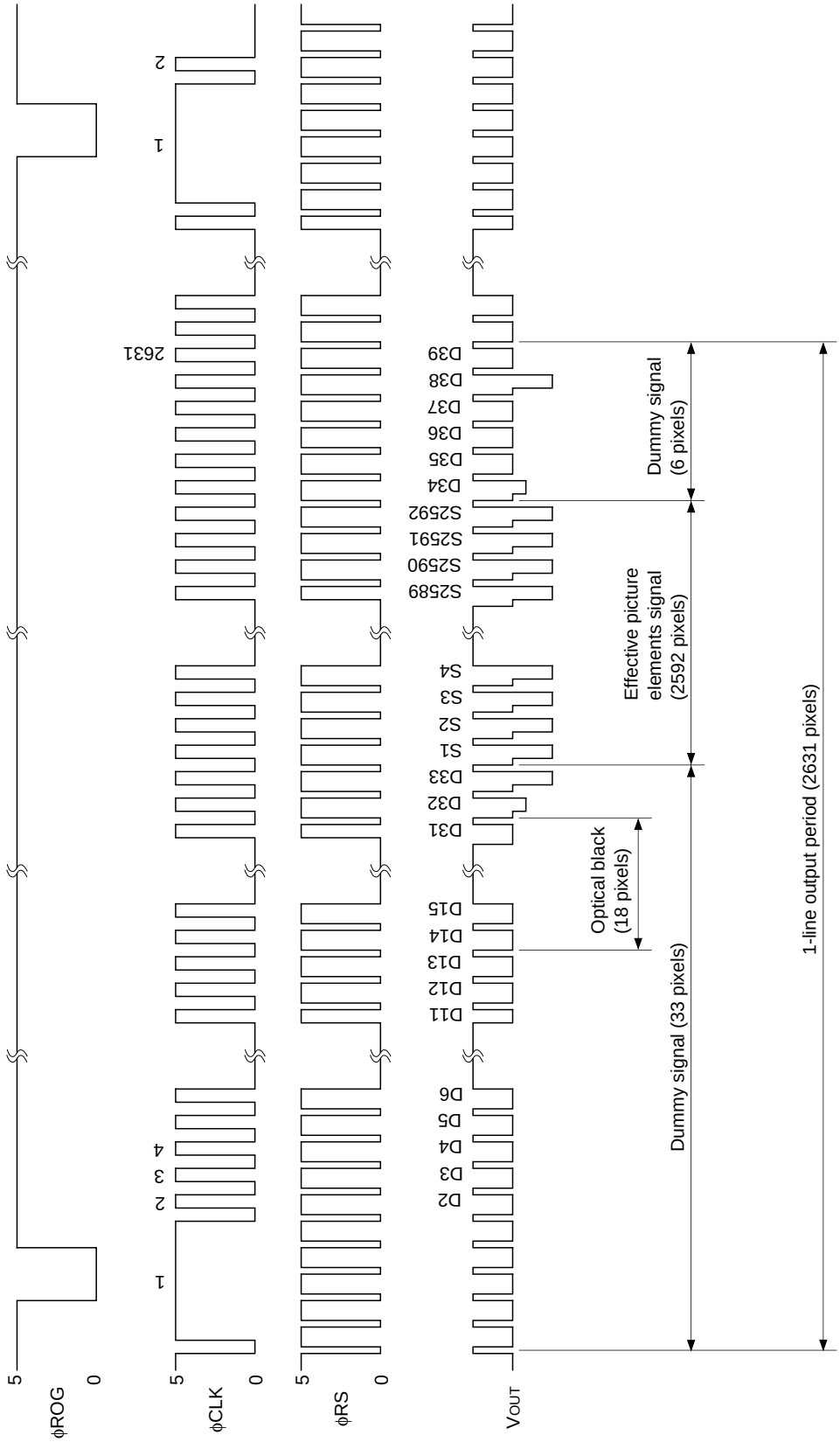


**Clock Timing Diagram** (For internal RS mode)

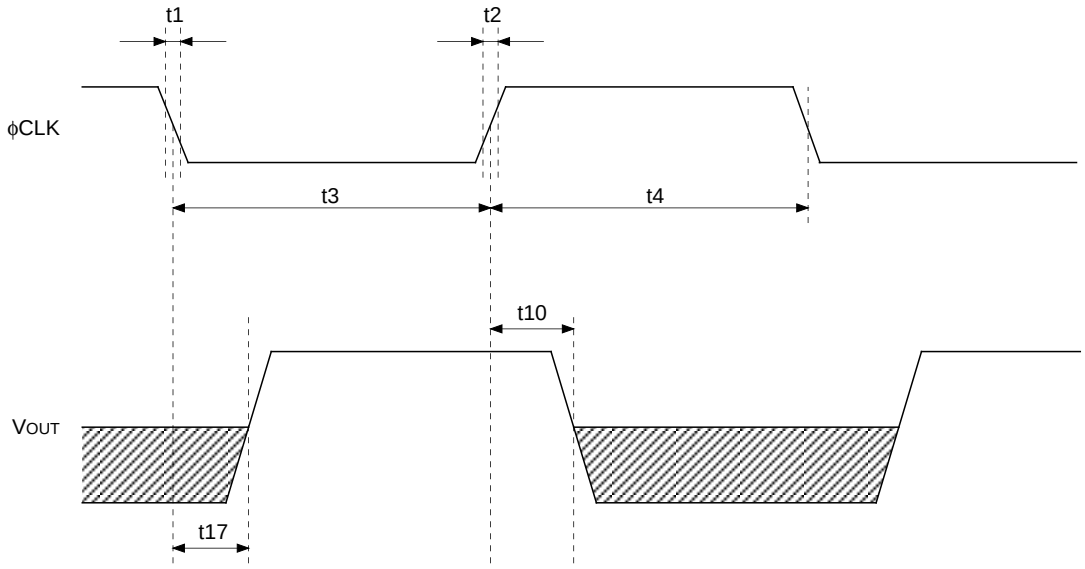



* Internal S/H is not in use

**Clock Timing Diagram** (For external RS mode)



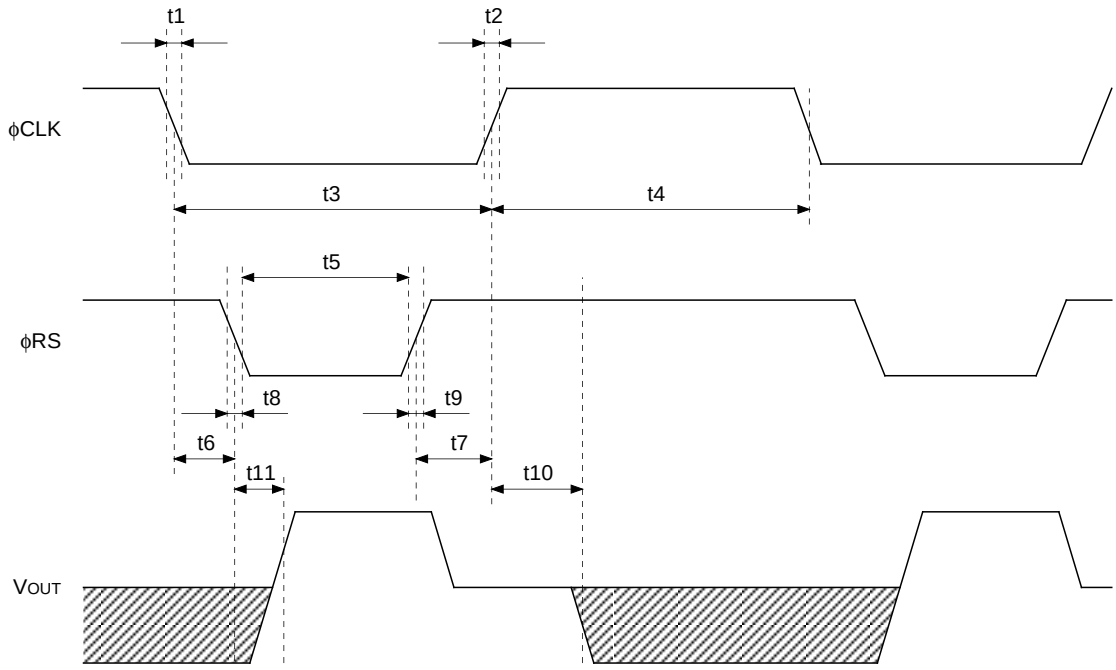
**φCLK, VOUT Timing** (For internal RS mode)




| Item | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| φCLK pulse rise/fall time | t1, t2 | 0 | 10 | — | ns |
| φCLK pulse duty*1 | — | 40 | 50 | 60 | % |
| φCLK – VOUT 1 | t10 | 50 | 80 | 110 | ns |
| φCLK – VOUT 2 | t17 | 30 | 75 | 120 | ns |

*1 $100 \times t3/(t3 + t4)$

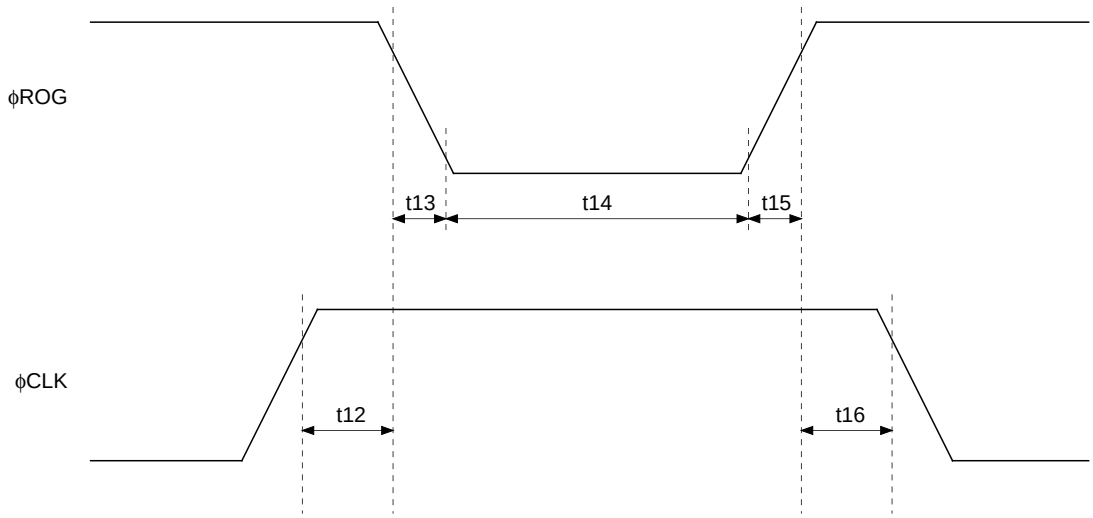
**φCLK, φRS, VOUT Timing** (For external RS mode)




| Item | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| φCLK, φRS pulse rise/fall time | t1, t2, t8, t9 | 0 | 10 | — | ns |
| φCLK pulse duty*1 | — | 40 | 50 | 60 | % |
| φCLK – φRS pulse timing | t6 | 0 | 100 | — | ns |
| φCLK – φRS pulse timing | t7 | 50 | 100 | — | ns |
| φRS pulse period | t5 | 50 | 100 | — | ns |
| φCLK – VOUT | t10 | 50 | 80 | 110 | ns |
| φRS – VOUT | t11 | 30 | 50 | 70 | ns |

*1 $100 \times t3/(t3 + t4)$

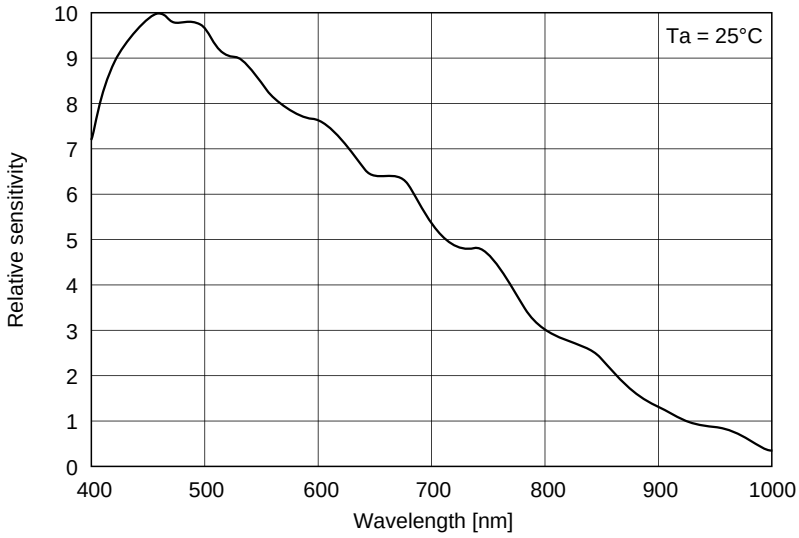
**ϕROG, ϕCLK Timing**



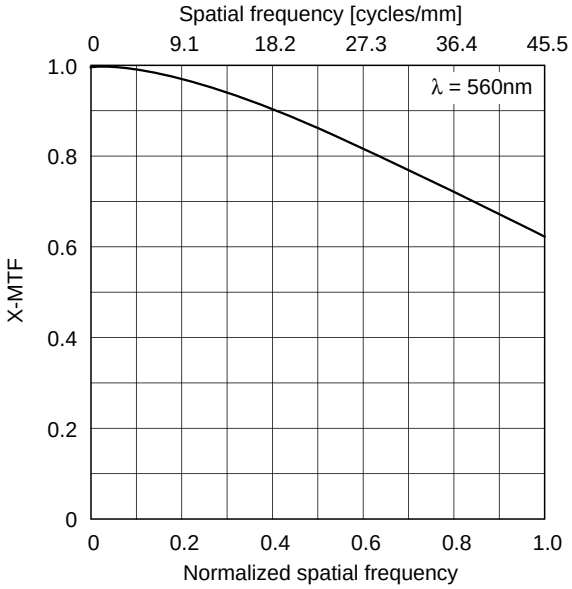

| Item | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| ϕROG, ϕCLK pulse timing | t12, t16 | 500 | 1000 | — | ns |
| ϕROG pulse rise/fall time | t13, t15 | 0 | 10 | — | ns |
| ϕROG pulse period | t14 | 500 | 1000 | — | ns |

## Example of Representative Characteristics

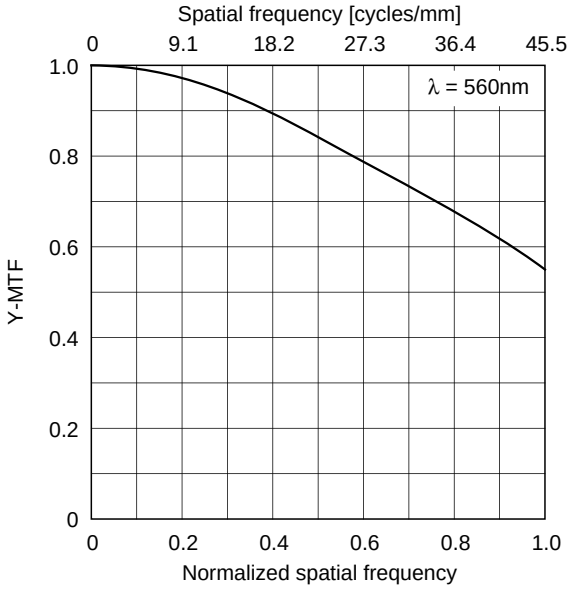
**Spectral sensitivity characteristics (Standard characteristics)**



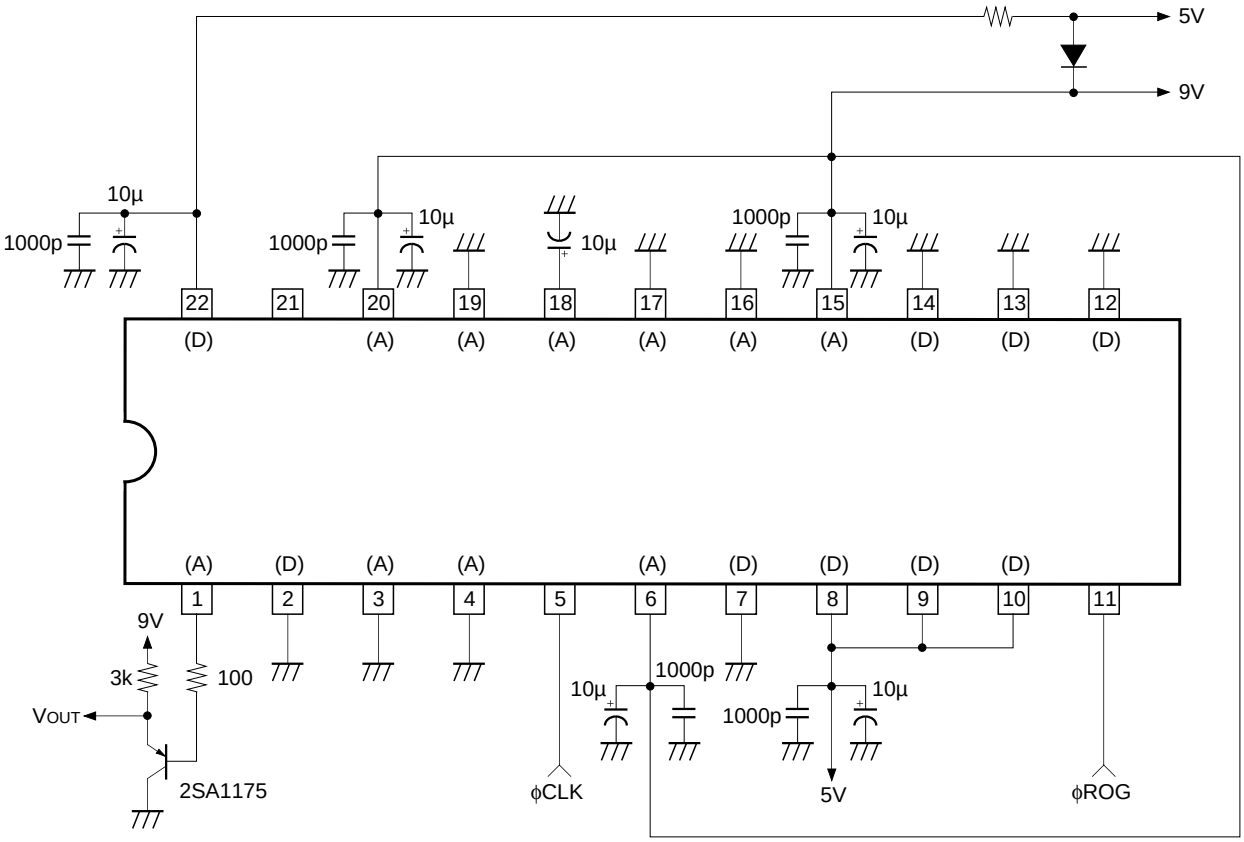

**MTF of main scanning direction (Standard characteristics)**




**MTF of sub scanning direction (Standard characteristics)**



**Application Circuit**




- Internal S/H is in use. Pin 4 must be connected to 5V DC power supply when S/H is not used.
- Internal RS mode is used. For the external RS mode, connect Pin 19 and Pin 4 to 5V DC power supply and input a proper clock pulse into Pin 10.
- When noise influence into output signal is large, connect pins indicated by (A) to the analog power supply and pins indicated by (D) to the digital power supply, and also use a decoupling capacitor of large capacitance.

Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

**Notes on Handling**

1) Static charge prevention
   CCD image sensors are easily damaged by static discharge. Before handling be sure to take the following protective measures.
   a) Either handle bare handed or use non chargeable gloves, clothes or material. Also use conductive shoes.
   b) When handling directly use an earth band.
   c) Install a conductive mat on the floor or working table to prevent the generation of static electricity.
   d) Ionized air is recommended for discharge when handling CCD image sensor.
   e) For the shipment of mounted substrates, use boxes treated for the prevention of static charges.

2) Regulation for raising and lowering the power supply voltage
   When raising the supply voltage, first raise $V_{DD1}$ (9V) and then $V_{DD2}$ (5V). Similarly, lower $V_{DD2}$ (5V) first and then $V_{DD1}$ (9V).

3) Soldering
   a) Make sure the package temperature does not exceed 80°C.
   b) Solder dipping in a mounting furnace causes damage to the glass and other defects. Use a grounded 30W soldering iron and solder each pin in less than 2 seconds. For repairs and remount, cool sufficiently.
   c) To dismount an image sensor, do not use a solder suction equipment. When using an electric desoldering tool, ground the controller. For the control system, use a zero cross type.

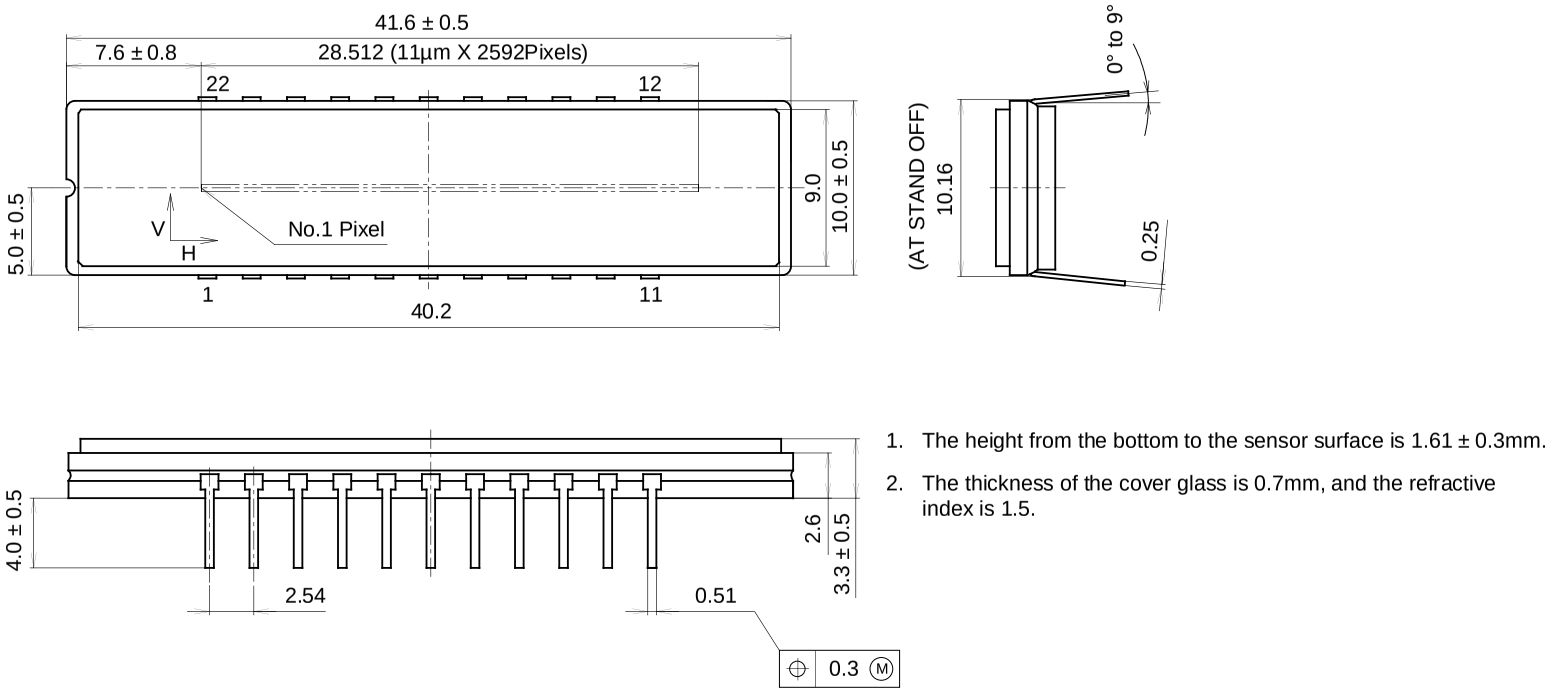
4) Dust and dirt protection
   a) Operate in clean environments.
   b) Do not either touch glass plates by hand or have any object come in contact with glass surfaces. Should dirt stick to a glass surface, blow it off with an air blower. (For dirt stuck through static electricity ionized air is recommended.)
   c) Clean with a cotton bud and ethyl alcohol if the grease stained. Be careful not to scratch the glass.
   d) Keep in a case to protect from dust and dirt. To prevent dew condensation, preheat or precool when moving to a room with great temperature differences.

5) Exposure to high temperatures or humidity will affect the characteristics. Accordingly avoid storage or usage in such conditions.

6) CCD image sensors are precise optical equipment that should not be subject to mechanical shocks.

**Package Outline** Unit: mm

22pin DIP (400mil)




1. The height from the bottom to the sensor surface is 1.61 ± 0.3mm.
2. The thickness of the cover glass is 0.7mm, and the refractive index is 1.5.

PACKAGE STRUCTURE

| | |
|---|---|
| PACKAGE MATERIAL | Cer-DIP |
| LEAD TREATMENT | TIN PLATING |
| LEAD MATERIAL | 42 ALLOY |
| PACKAGE WEIGHT | 3.9g |