SONY

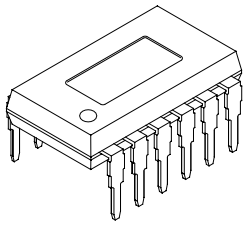
ILX521A

256-pixel CCD Linear Image Sensor (B/W)

Description

The ILX521A is a rectangular reduction type CCD linear image sensor designed for image scanner sensor. A built-in timing generator and clock driver ensure single 5V power supply for easy use.

12 pin SDIP (MOLD)



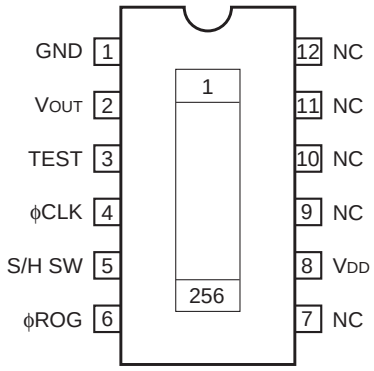
Features

- Number of effective pixels: 256 pixels
- Pixel size: 14µm × 14µm (14µm pitch)
- Built-in timing generator and clock driver
- Built-in S/H circuit
- Maximum data rate: 2MHz
- Single 5V power supply
- Clear mold package (12-pin SDIP)

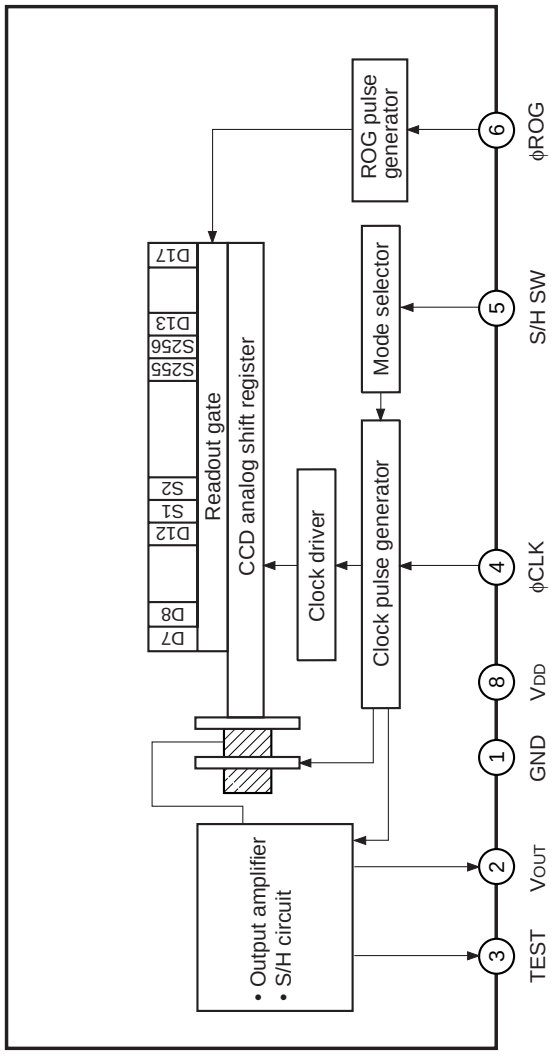
Absolute Maximum Ratings

• Supply voltage	V_{DD}	6	V
• Operating temperature		–10 to +60	°C
• Storage temperature		–30 to +80	°C

Pin Configuration (Top View)



Block Diagram



E99154-PS

Pin Description

Pin No.	Symbol	Description
1	GND	GND
2	V_{OUT}	Signal output
3	TEST	Test (open)
4	ϕCLK	Clock pulse input
5	S/H SW	Switching of with S/H or without S/H
6	ϕROG	Readout gate pulse input
7	NC	NC
8	V_{DD}	5V power supply
9	NC	NC
10	NC	NC
11	NC	NC
12	NC	NC

Recommended Voltage

Item	Min.	Typ.	Max.	Unit
V_{DD}	4.75	5.0	5.25	V

Mode Description

Used mode	Pin 5 S/H SW
with S/H	GND
without S/H	V_{DD}

Input Clock Voltage Condition[*1]

Item	Symbol	Min.	Typ.	Max.	Unit
High level	V_{IH}	4.5	V_{DD}	V_{DD} + 0.5	V
Low level	V_{IL}	0	—	0.5	V

[*1] This is applied to the all external pulses. (ϕCLK, ϕROG)

Input Pin Capacity

Item	Symbol	Min.	Typ.	Max.	Unit
Input capacity of ϕCLK pin	CϕCLK	—	10	—	pF
Input capacity of ϕROG pin	CϕROG	—	10	—	pF

Electrooptical Characteristics

(Ta = 25°C, V_{DD} = 5V, Data rate = 1MHz, Without S/H mode, Light source = 3200K, IR cut filter CM-500S (t = 1mm))

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Sensitivity	R	13.3	19.0	24.7	V/(lx · s)	Note 1
Sensitivity nonuniformity	PRNU	—	5.0	12.0	%	Note 2
Saturation output voltage	V_{SAT}	0.6	0.8	—	V	—
Dark voltage average	V_{DRK}	—	0.3	2.0	mV	Note 3
Dark signal nonuniformity	DSNU	—	0.5	3.0	mV	Note 3
Image lag	IL	—	0.02	—	%	Note 4
Dynamic range	DR	—	2666	—		Note 5
Saturation exposure	SE	—	0.042	—	lx · s	Note 6
Current consumption	I_{VDD}	—	5.0	10.0	mA	—
Total transfer efficiency	TTE	92.0	98.0	—	%	—
Output impedance	Z_O	—	350	—	Ω	—
Offset level	V_{OS}	—	3.8	—	V	Note 7

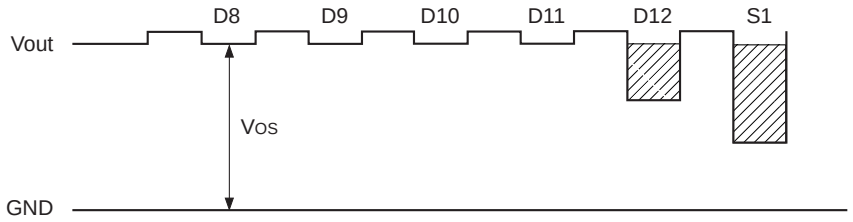
Note)

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

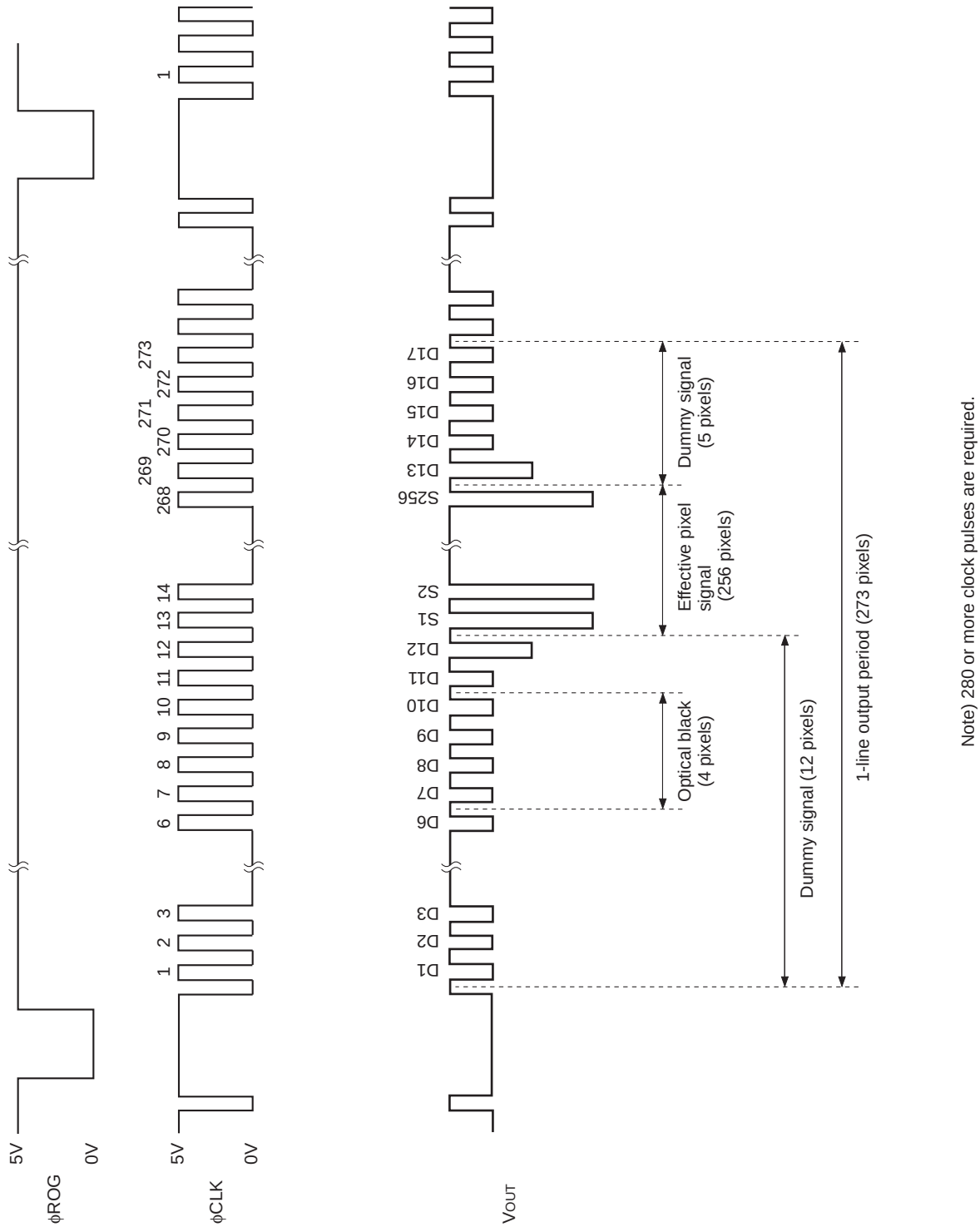
$$PRNU = \frac{(V_{MAX} - V_{MIN})/2}{V_{AVE}} \times 100\ [\%]$$

   The maximum output of the 256 pixels is set to V_{MAX}, the minimum output to V_{MIN} and the average output to V_{AVE}.
3. Integration time is 10ms.
4. V_{OUT} = 500mV.
5. DR = V_{SAT}/V_{DRK}

   When optical integration time is shorter, the dynamic range sets wider because dark output voltage is in proportion to optical integration time.
6. SE = $V_{SAT}/R1$
7. Vos is defined as indicated below.

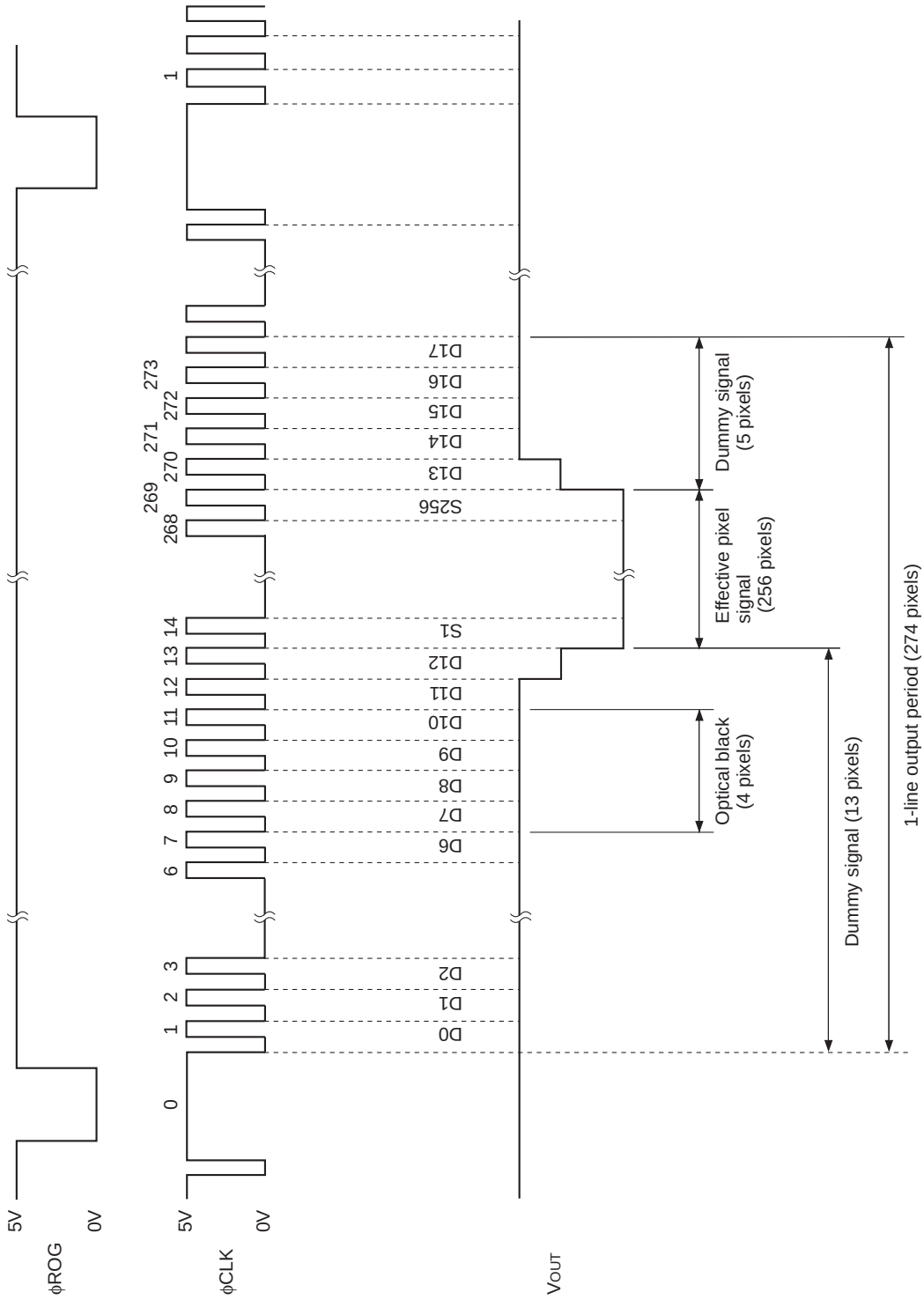


Clock Timing Diagram (without internal S/H mode)



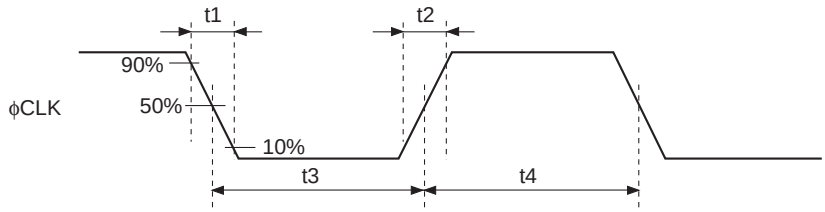
Note) 280 or more clock pulses are required.

Clock Timing Diagram (with internal S/H mode)



Note) 280 or more clock pulses are required.

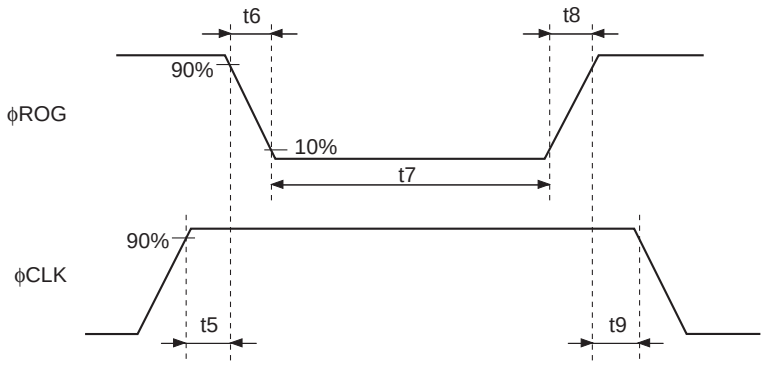
φCLK Timing (For all modes)



Item	Symbol	Min.	Typ.	Max.	Unit
φCLK pulse rise/fall time	t1, t2	0	10	100	ns
φCLK pulse Duty*1	—	40	50	60	%

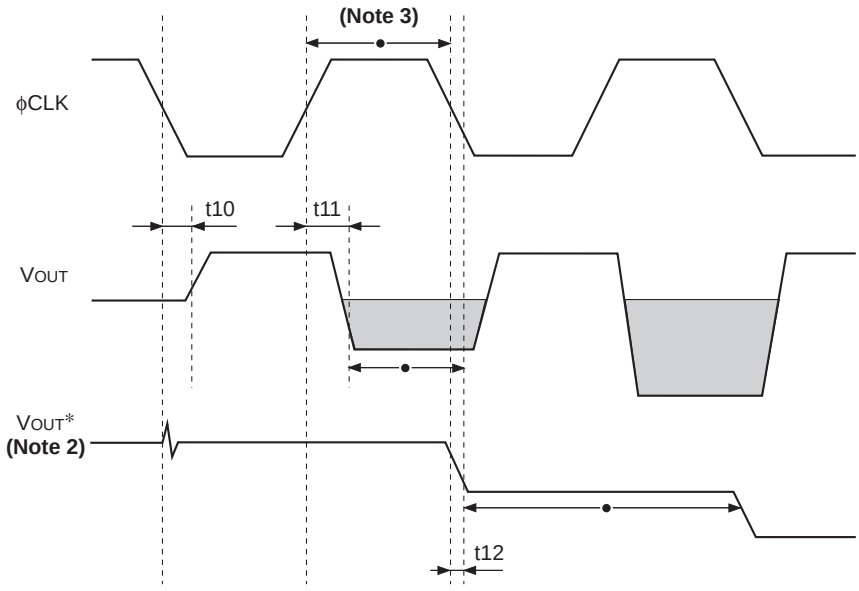
*1 $100 \times t4/(t3 + t4)$

φROG, φCLK Timing



Item	Symbol	Min.	Typ.	Max.	Unit
φROG, φCLK pulse timing 1	t5	500	1000	—	ns
φROG, φCLK pulse timing 2	t9	500	1000	—	ns
φROG pulse rise/fall time	t6, t8	0	10	—	ns
φROG pulse period	t7	500	1000	—	ns

φCLK Output Signal Timing (Note 1)



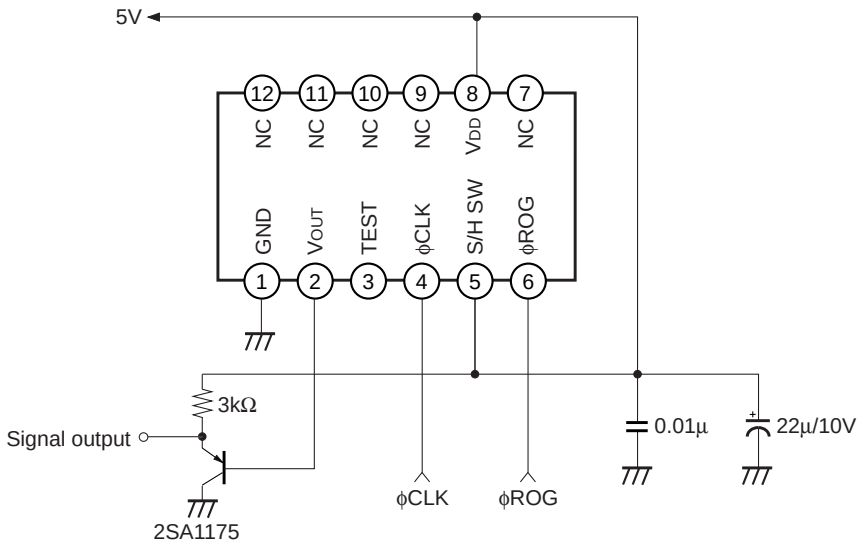
Item	Symbol	Min.	Typ.	Max.	Unit
φCLK – VOUT output delay time 1	t10	—	150	—	ns
φCLK – VOUT output delay time 2	t11	—	220	—	ns
φCLK – VOUT* (with S/H) output delay time	t12	—	110	—	ns

Note 1) fck = 1MHz, φCLK pulse Duty = 50%, φCLK pulse rise/fall time = 10ns

Note 2) Output waveform when internal S/H circuit is used.

Note 3) • is data period.

Application Circuit (without internal S/H mode)

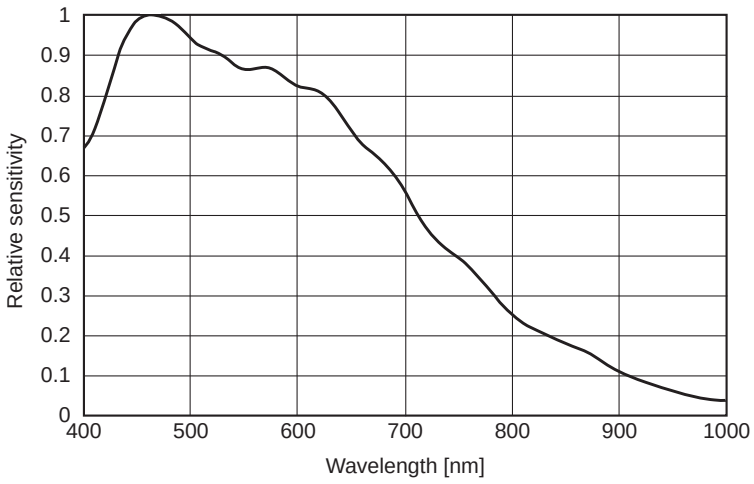


Note) This circuit diagram is the case when internal S/H mode is not used.
Connect Pin 5 to GND when internal S/H mode is used.

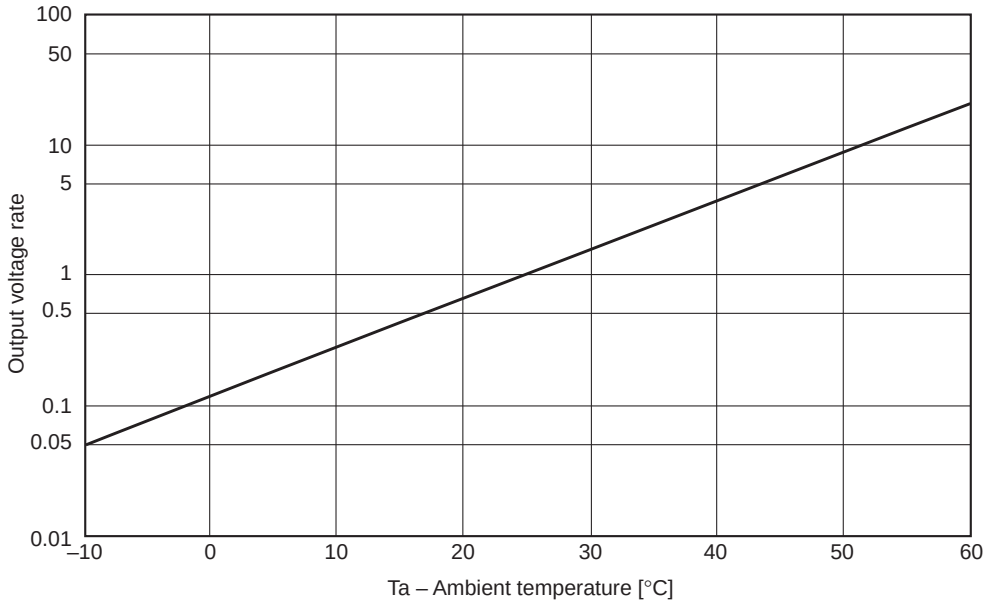
Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

Example of Representative Characteristics

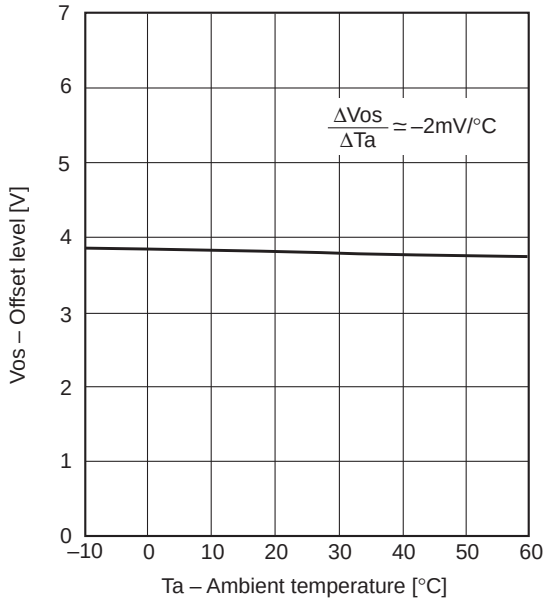
Spectral sensitivity characteristics (Standard characteristics)



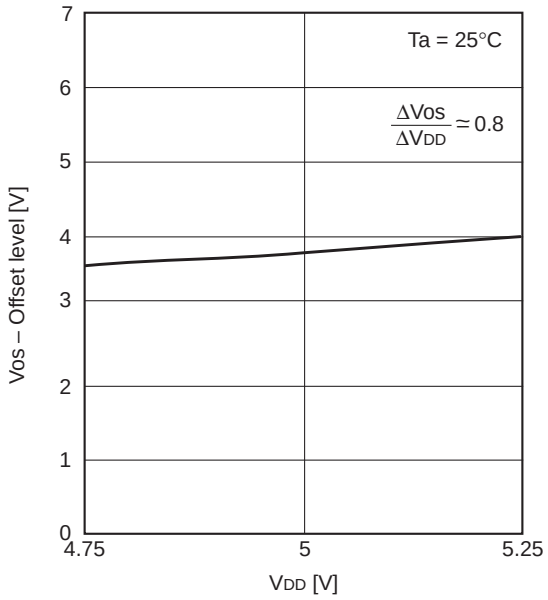
Output voltage vs. Temperature characteristics (Standard characteristics)



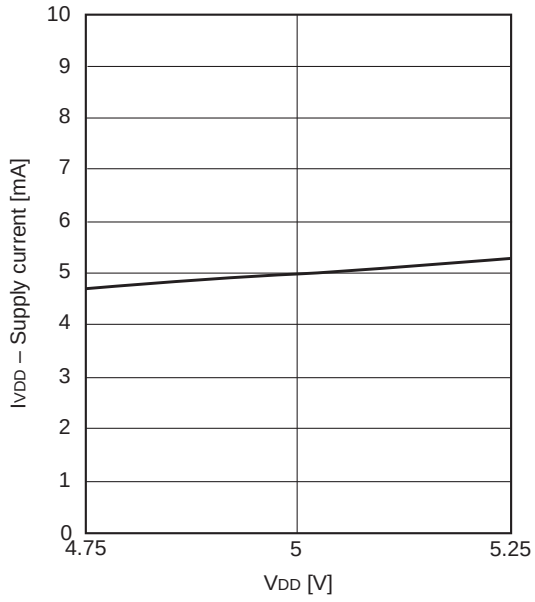
Offset level vs. Temperature characteristics (Standard characteristics)



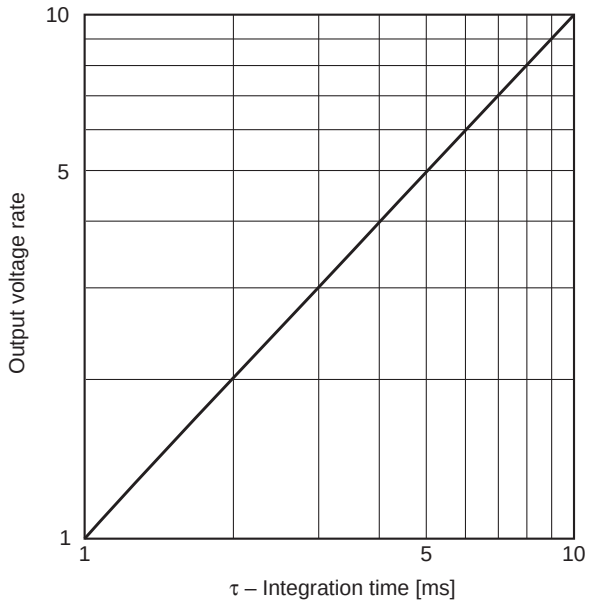
Offset level vs. VDD characteristics (Standard characteristics)



Supply current vs. VDD characteristics (Standard characteristics)



Output voltage vs. Integration time (Standard characteristics)



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 sensors.
   e) For the shipment of mounted substrates, use boxes treated for the prevention of static charges.

2) Soldering
   a) Make sure the package temperature does not exceed 80°C.
   b) 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 solder suction equipment. When using an electric desoldering tool, ground the controller. For the temperature control system, use a zero-cross type.

3) Dust and dirt protection
   a) Operate in clean environments.
   b) Do not either touch mirror surfaces by hand or have any object come in contact with mirror surfaces. Should dirt stick to a mirror 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 mirror surfaces are grease stained. Be careful not to scratch the mirror surfaces.
   d) Keep in a case to protect from dust and dirt. To prevent dew condensation on the mirror surfaces, preheat or precool when moving to a room with great temperature differences.

4) Do not expose to intense light for long periods.

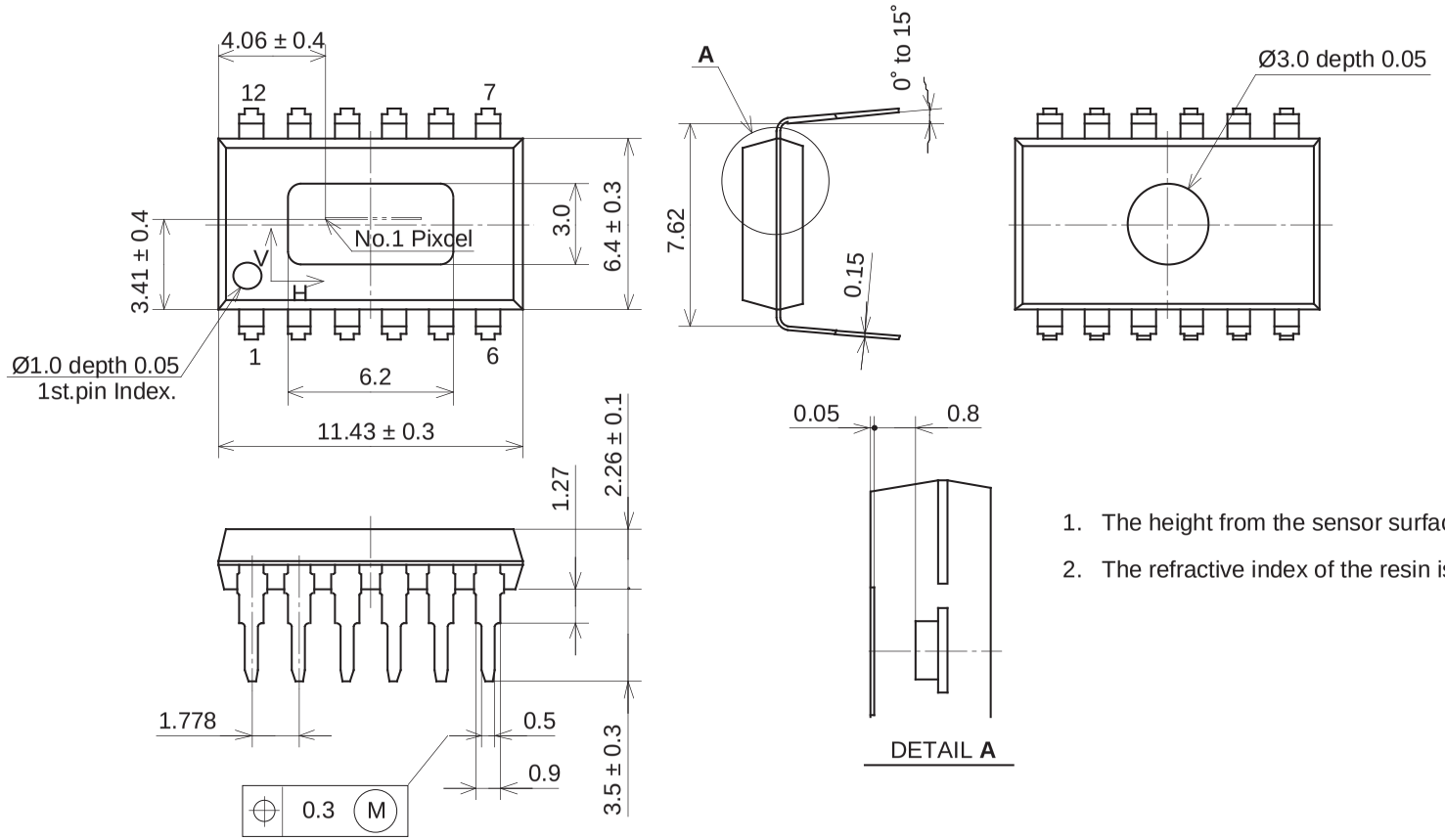
5) Exposure to high temperatures or humidity will affect the characteristics. Accordingly avoid storage or usage in such conditions.

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

7) Normal output signal is not obtained immediately after device switch on.

Package Outline Unit: mm

12pin DIP (300mil)



1. The height from the sensor surface is 1.41 ± 0.3mm.
2. The refractive index of the resin is 1.57.

PACKAGE STRUCTURE

PACKAGE MATERIAL	Plastic
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	42ALLOY
PACKAGE MASS	0.28g
DRAWING NUMBER	LS-F5(E)