

7078 × 3pixel CCD Linear Sensor (Color)

For the availability of this product, please contact the sales office.

Description

The ILX520K is a reduction type CCD linear sensor developing for color image scanner. This sensor reads A3-size documents at a density of 600 DPI.

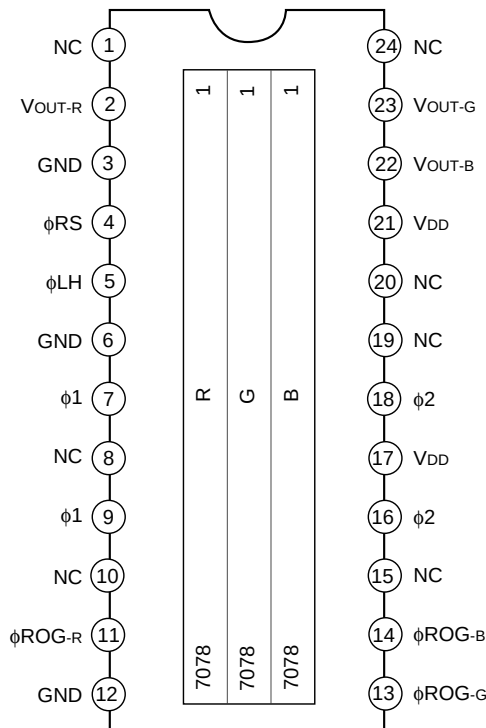
Features

- Number of effective pixels: 21234 pixels
(7078 pixels × 3)
- Pixel size: 8μm × 8μm (8μm pitch)
- Distance between line: 64μm (8 Lines)
- Single-sided readout
- Ultra low lag / Ultra high sensitivity
- Single 12V power supply
- Input clock pulse: CMOS 5V drive
- Number of output: 3 (R, G, B)
- Package: 24 pin DIP (400 mil)

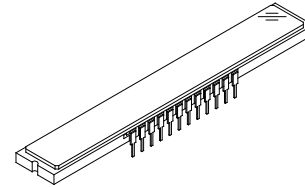
Absolute Maximum Ratings

- Supply voltage V_{DD} 15 V
- Operating temperature -10 to +55 °C
- Storage temperature -30 to +80 °C

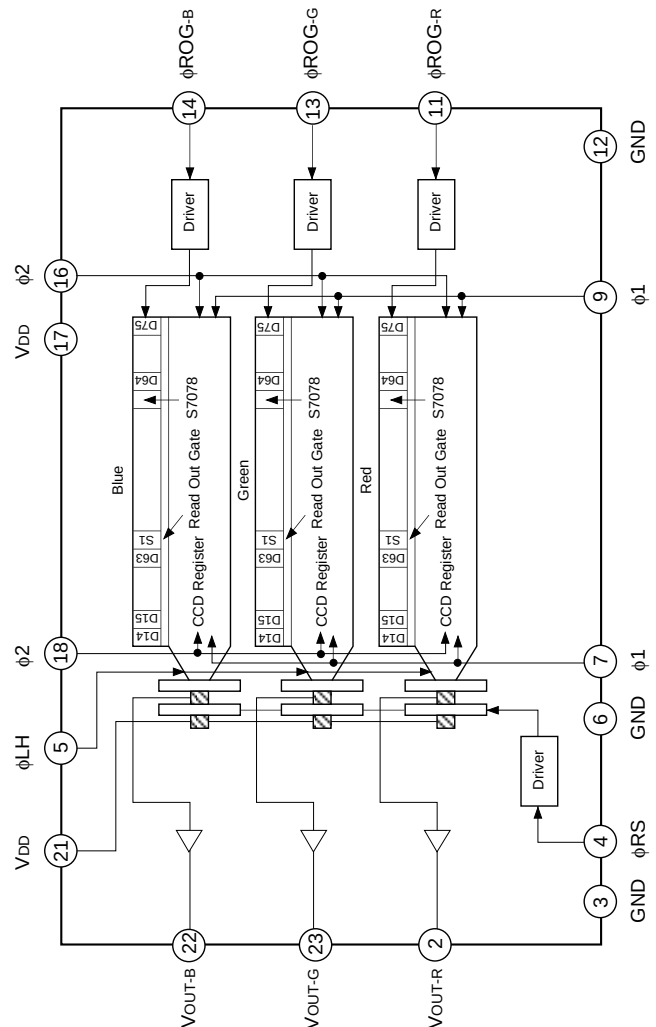
Pin Configuration (Top View)



24 pin DIP



Block Diagram



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Pin Description

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	NC	NC	13	ϕ ROG-G	Clock pulse input
2	V _{OUT-R}	Signal out (red)	14	ϕ ROG-B	Clock pulse input
3	GND	GND	15	NC	NC
4	ϕ RS	Clock pulse input	16	ϕ 2	Clock pulse input
5	ϕ LH	Clock pulse input	17	V _{DD}	12V power supply
6	GND	GND	18	ϕ 2	Clock pulse input
7	ϕ 1	Clock pulse input	19	NC	NC
8	NC	NC	20	NC	NC
9	ϕ 1	Clock pulse input	21	V _{DD}	12V power supply
10	NC	NC	22	V _{OUT-B}	Signal out (blue)
11	ϕ ROG-R	Clock pulse input	23	V _{OUT-G}	Signal out (green)
12	GND	GND	24	NC	NC

Recommended Supply Voltage

Item	Min.	Typ.	Max.	Unit
V _{DD}	11.4	12	12.6	V

Clock Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Input capacity of ϕ 1, ϕ 2	C ϕ 1, C ϕ 2	—	1100	—	pF
Input capacity of ϕ LH	C ϕ LH	—	10	—	pF
Input capacity of ϕ RS	C ϕ RS	—	10	—	pF
Input capacity of ϕ ROG*	C ϕ ROG	—	10	—	pF

* It indicates that ϕ ROG-R, ϕ ROG-G, ϕ ROG-B as ϕ ROG.

Clock Frequency

Item	Symbol	Min.	Typ.	Max.	Unit
ϕ 1, ϕ 2, ϕ LH, ϕ RS	f ϕ 1, f ϕ 2, f ϕ LH, f ϕ RS	—	1	5	MHz

Input Clock Pulse Voltage Condition

Item		Min.	Typ.	Max.	Unit
ϕ 1, ϕ 2, ϕ LH, ϕ RS, ϕ ROG pulse voltage	High level	4.75	5.0	5.25	V
	Low level	—	0	0.1	V

Electrooptical Characteristics (Note 1)

Ta = 25°C, VDD = 12V, f_{RS} = 1MHz, Input clock = 5Vp-p, Light source = 3200K, IR cut filter CM-500S (t = 1.0mm)

Item		Symbol	Min.	Typ.	Max.	Unit	Remarks
Sensitivity	Red	R _R	1.3	2.0	2.7	V/(lx · s)	Note 2
	Green	R _G	2.1	3.2	4.3		
	Blue	R _B	1.6	2.5	3.4		
Sensitivity nonuniformity		PRNU	—	4	20	%	Note 3
Saturation output voltage		V _{SAT}	2	3.2	—	V	Note 4
Saturation exposure	Red	SE _R	0.74	1.6	—	lx · s	Note 5
	Green	SE _G	0.46	1	—		
	Blue	SE _B	0.58	1.28	—		
Dark voltage average		V _{DRK}	—	0.3	2	mV	Note 6
Dark signal nonuniformity		DSNU	—	1.5	5	mV	Note 6
Image lag		IL	—	0.02	—	%	Note 7
Supply current		I _{VDD}	—	26	50	mA	—
Total transfer efficiency		TTE	92	98	—	%	—
Output impedance		Z _O	—	250	—	Ω	—
Offset level		V _{OS}	—	6.5	—	V	Note 8
Dynamic range		DR	1000	10670	—	—	Note 9

Note

- 1) In accordance with the given electrooptical characteristics, the black level is defined as the average value of D2, D3 to D12.
- 2) For the sensitivity test light is applied with a uniform intensity of illumination.
- 3) PRNU is defined as indicated below. Ray incidence conditions are the same as for Note 2.

V_{OUT} = 500mV (Typ.)

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

Where the 7078 pixels are divided into blocks of 114 (Last block is 124 pixel). The maximum output of each block is set to V_{MAX}, the minimum output to V_{MIN} and the average output to V_{AVE}.

- 4) Use below the minimum value of the saturation output voltage.
- 5) Saturation exposure is defined as follows.

$$\text{SE} = \frac{V_{\text{SAT}}}{R}$$

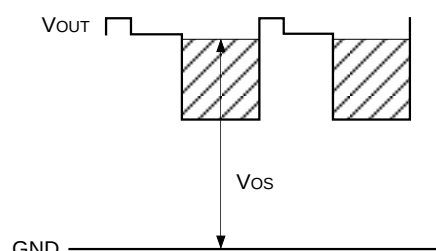
Where R indicates R_R, R_G, R_B, and SE indicates SE_R, SE_G, SE_B.

- 6) Optical signal accumulated time τ int stands at 10ms.
- 7) V_{OUT} = 500mV (Typ.)
- 8) V_{OS} is defined as indicated bellow.

V_{OUT} indicates V_{OUT-R}, V_{OUT-G}, and V_{OUT-B}.

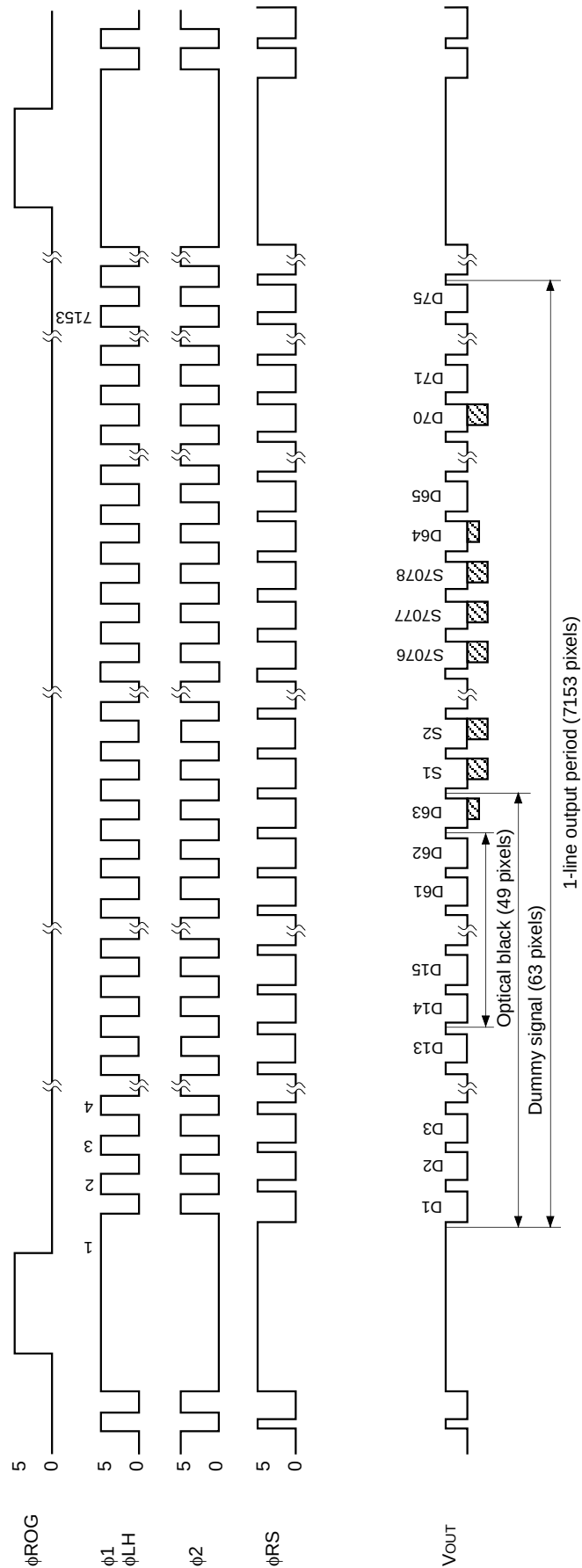
- 9) Dynamic range is defined as follows.

$$\text{DR} = \frac{V_{\text{SAT}}}{V_{\text{DRK}}}$$



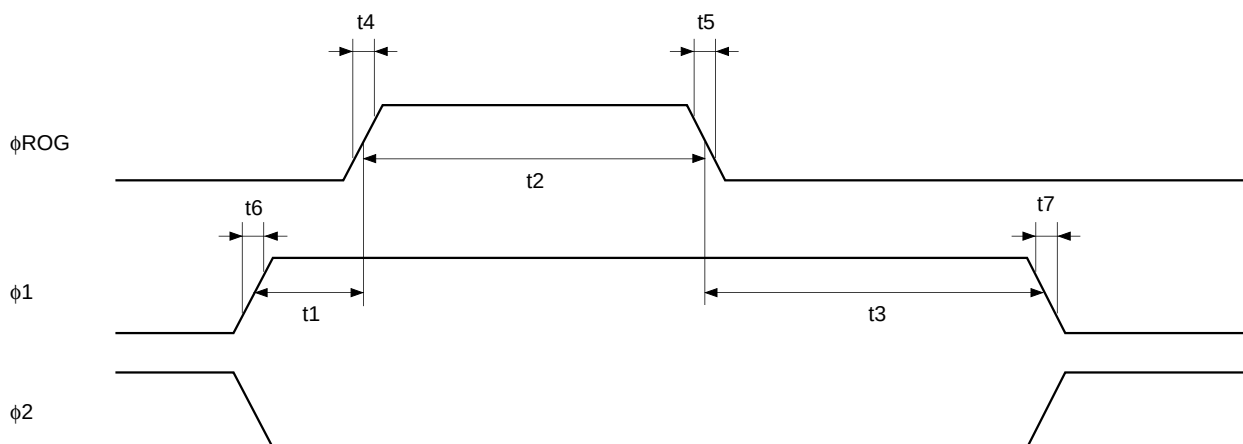
When the optical signal accumulated time is shorter, the dynamic range gets wider because the optical signal accumulated time is in proportion to the dark voltage.

Clock Timing Chart 1

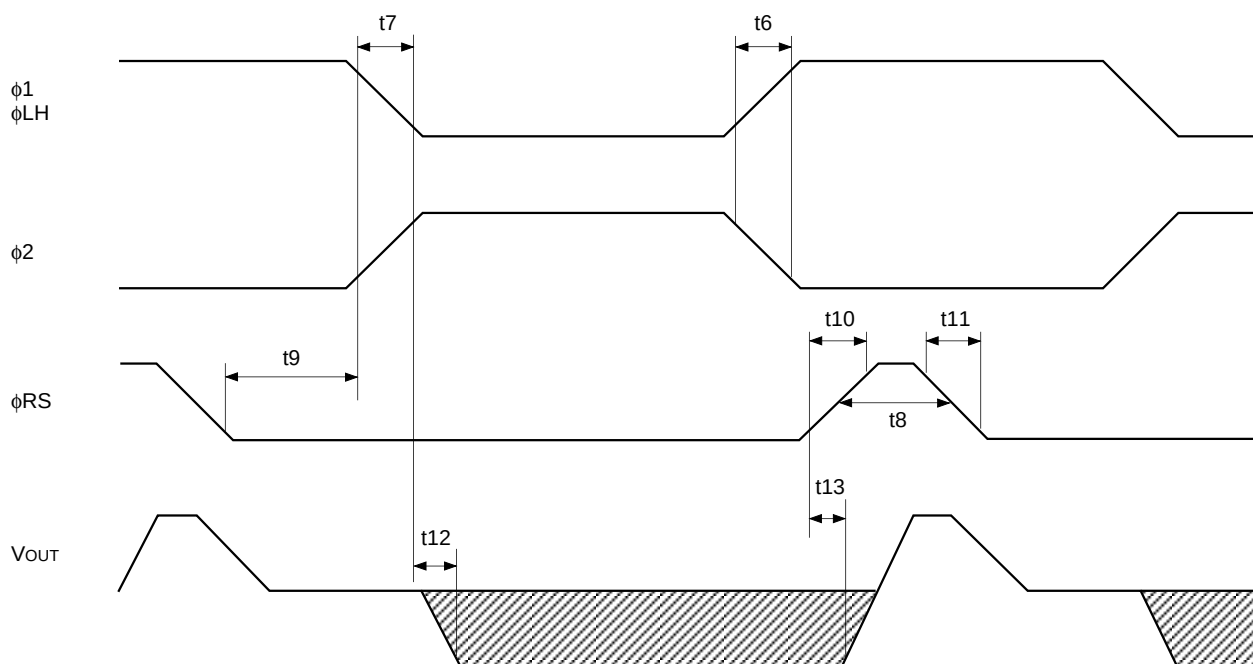


Note) The transfer pulses (ϕ_1 , ϕ_2 , ϕ_{LH}) must have more than 7153 cycles.

Clock Timing Chart 2



Clock Timing Chart 3

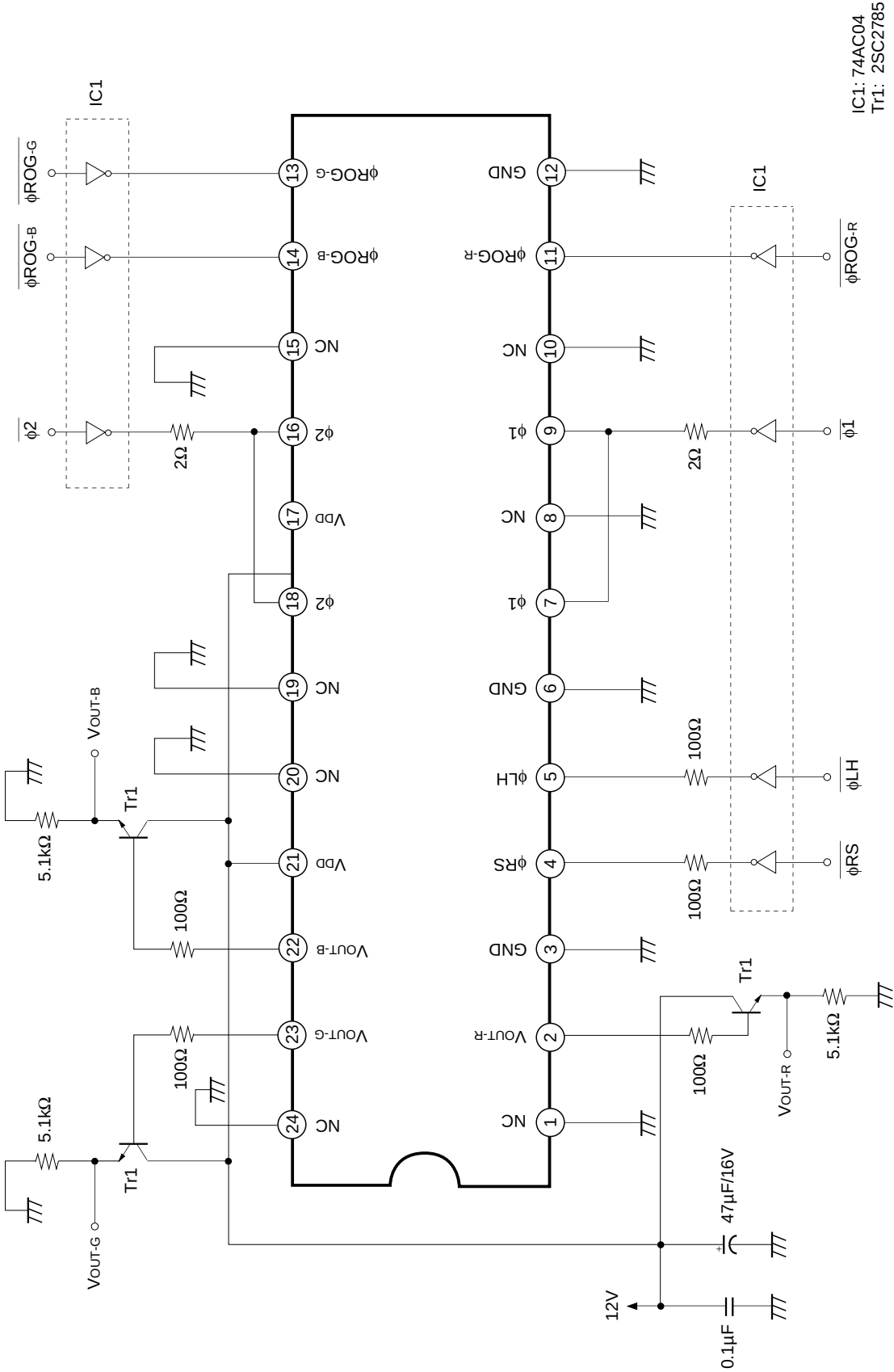


Clock Pulse Recommended Timing

Item	Symbol	Min.	Typ.	Max.	Unit
ϕ ROG, ϕ 1 pulse timing	t1	50	100	—	ns
ϕ ROG pulse high level period	t2	1200	1500	—	ns
ϕ ROG, ϕ 1 pulse timing	t3	1200	1500	—	ns
ϕ ROG pulse rise time	t4	0	5	10	ns
ϕ ROG pulse fall time	t5	0	5	10	ns
ϕ 1 pulse rise time / ϕ 2 pulse fall time	t6	0	20	60	ns
ϕ 1 pulse fall time / ϕ 2 pulse rise time	t7	0	20	60	ns
ϕ RS pulse high level period	t8	45	250 ^{*1}	—	ns
ϕ RS, ϕ LH pulse timing	t9	45	250 ^{*1}	—	ns
ϕ RS pulse rise time	t10	0	10	30	ns
ϕ RS pulse fall time	t11	0	10	30	ns
Signal output delay time	t12	—	10	—	ns
	t13	—	10	—	ns

^{*1} These timing is the recommended condition under $f_{\phi RS} = 1\text{MHz}$.

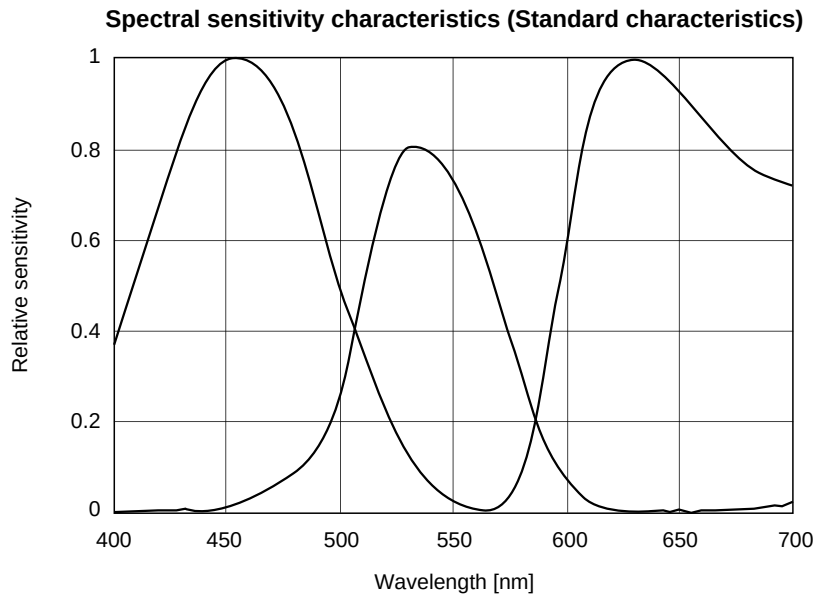
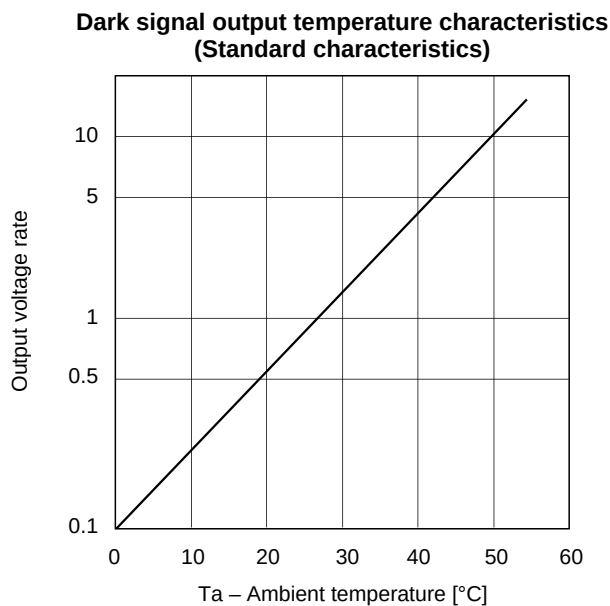
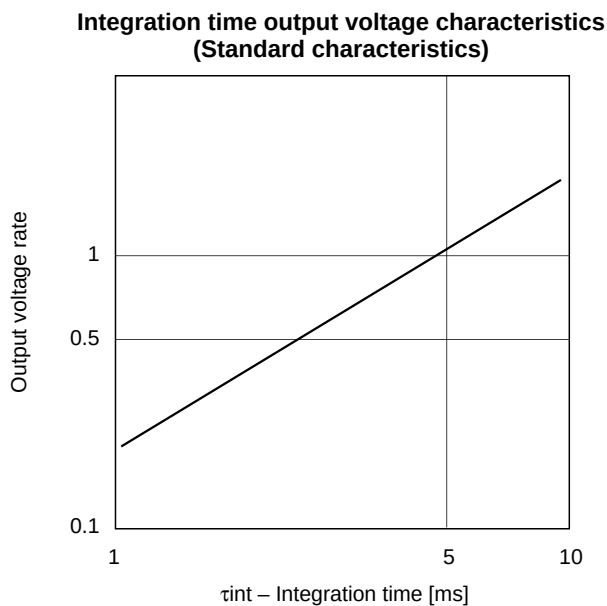
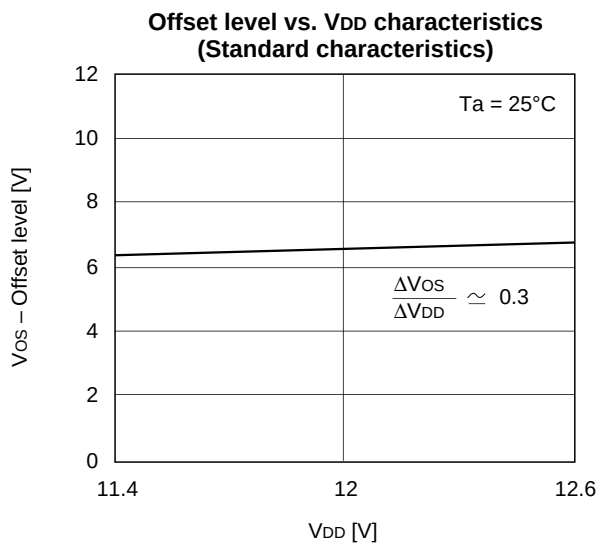
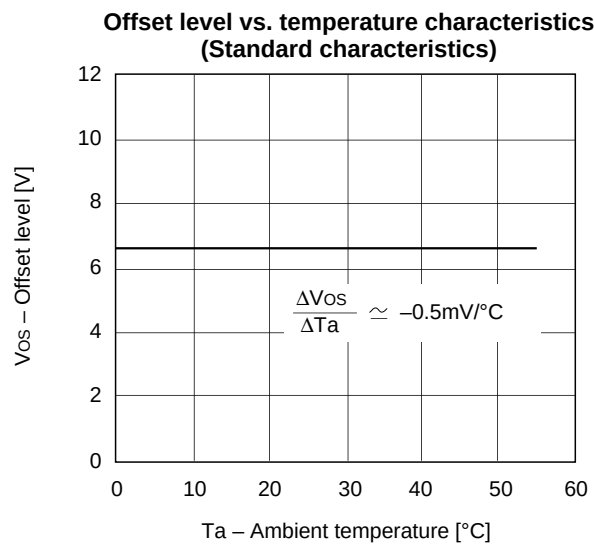
Application Circuit*



* Data rate $f_{\phi RS} = 1\text{MHz}$.

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Example of Representative Characteristics ($V_{DD} = 12V$, $T_a = 25^{\circ}C$)



Notes of 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 prevention of static charges.

2) 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 then 2 seconds. For repairs and remount, cool sufficiently.
- c) To dismount an imaging device, 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.

3) Dust and dirt protection

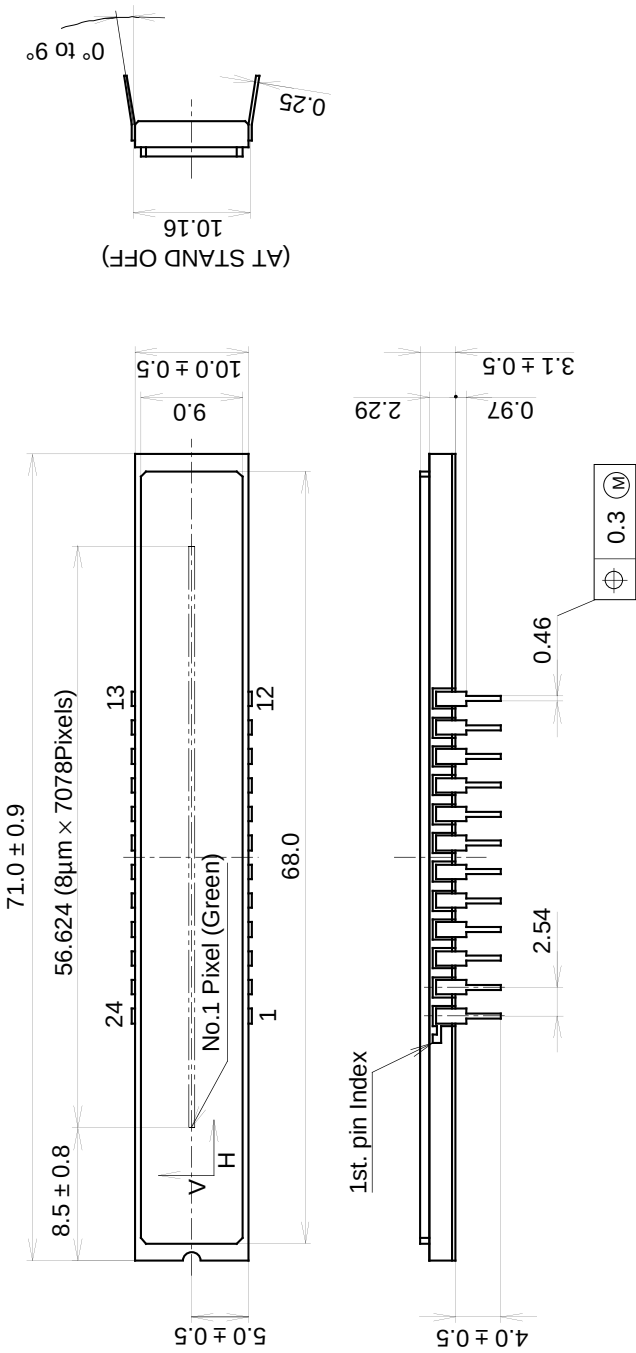
- a) Operate in clean environments.
- b) Do not either touch glass plates by hand or have any object come in contact with glass surfaces. Should dirt stick to a glass surface, blow it off with an air blower. (For dirt stuck through static electricity ionized air is recommended.)
- c) Clean with a cotton bud and ethyl alcohol if the glass surface is 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.

4) 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

24Pin DIP (400mil)



- 1. The height from the bottom to the sensor surface is 1.4 ± 0.3mm.
- 2. The thickness of the cover glass is 0.8mm, and the refractive index is 1.5.

PACKAGE STRUCTURE

PACKAGE MATERIAL	Ceramic
LEAD TREATMENT	GOLD PLATING
LEAD MATERIAL	42ALLOY
PACKAGE WEIGHT	5.8g