

CCD Area Image Sensor MN39470PT/39471PT

Overview

MN39470PT and MN39471PT are CCD image sensors, best suited to high quality digital still cameras. On-chip RGB-Bayer-arrangement primary color filters produce superior color reproduction. A skipped readout mode allows a monitor-mode data readout.

Features

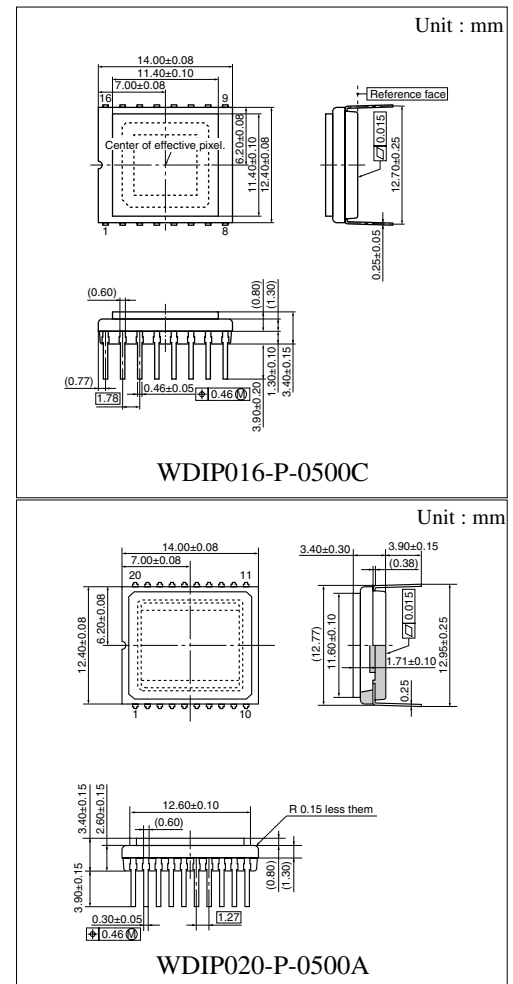
- High sensitivity
- Low smear
- Low-voltage horizontal CCD operation at 3.3 V, resulting in low power consumption of a system
- High S/N ratio and wide dynamic range
- High resolution

Applications

- Digital still cameras
- FA and OA cameras

Specifications

Parameter	MN39470PT	MN39471PT
Optical format size	Type-1/2.72 (6.63mm diagonal)	Type-1/2.6 (6.93mm diagonal)
Total pixel count	1,700(H) × 1,240(V)=2,108,000	1,901(H) × 1,212(V)=2,304,012
Valid pixel count	1,648(H) × 1,236(V)=2,036,928	1,816(H) × 1,208(V)=2,193,728
Aspect ratio	4 : 3	3 : 2
Pixel size	3.25 μm(H) × 3.25 μm(V)	3.2 μm(H) × 3.2 μm(V)
Sensitivity (F8)	260 mV(typ)	250 mV(typ)
Saturation output voltage	420 mV (typ)	
Smear	-84 dB (typ)	
Package type	16-pin plastic package	20-pin plastic package



† The products and specifications are subject to change without any notice. Please ask for the latest product standards to guarantee the satisfaction of your product requirements.

MN39470PT

Diagonal 6.63 mm (type-1/2.72) 2.11M-pixel CCD Area Image Sensor

■ Overview

The MN39470PT is a super high resolution CCD area image sensor which includes 2.11M pixels in type-1/2.72 image format size.

Adopting RGB Bayer arrangement in primary color filter array on chip provides excellent color reproduction.

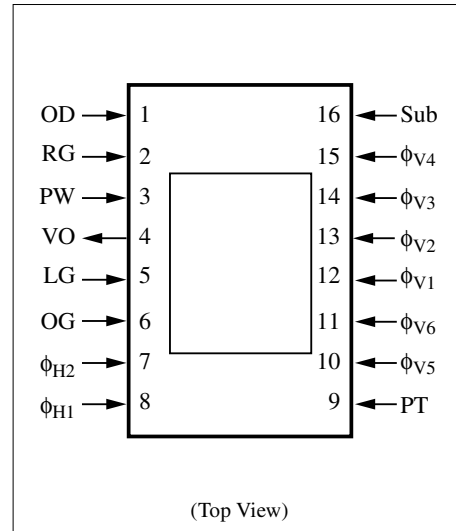
This device can perform a monitor mode readout by 1/4 skipping readout.

So, this device allows for application for a compact and high picture quality digital still camera.

Part Number	Size	Scanning mode	Color or B/W
MN39470PT	6.63 mm (type-1/2.72)	IS *	Color

Note) Interlace scan

■ Pin Assignments



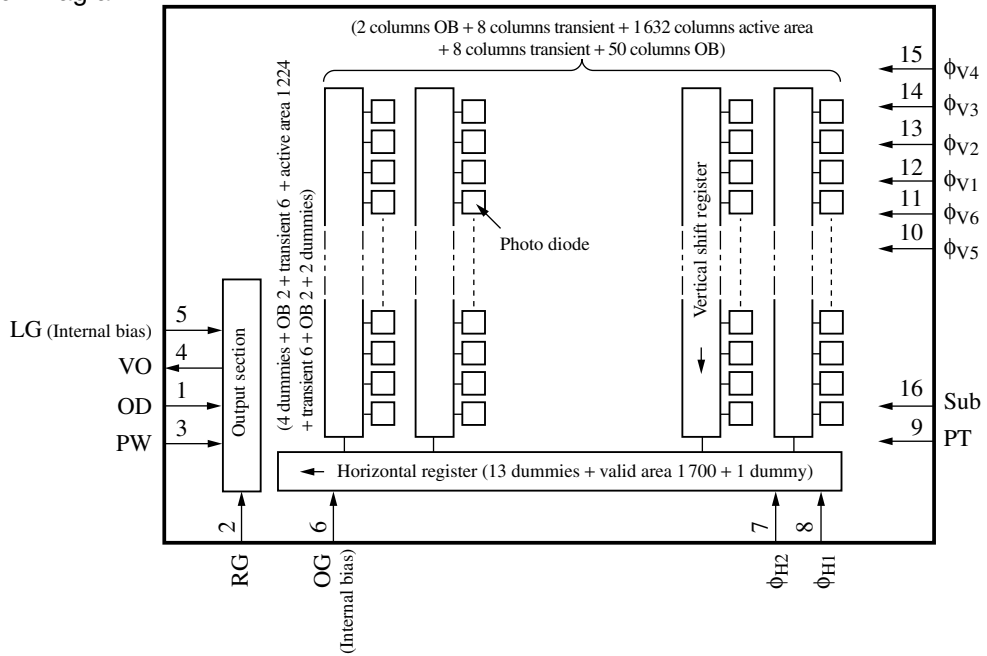
■ Features

- High sensitivity
- Low smear
- Low noise and broad dynamic range
- 3.3 V for horizontal CCDs and low power consumption
- High resolution

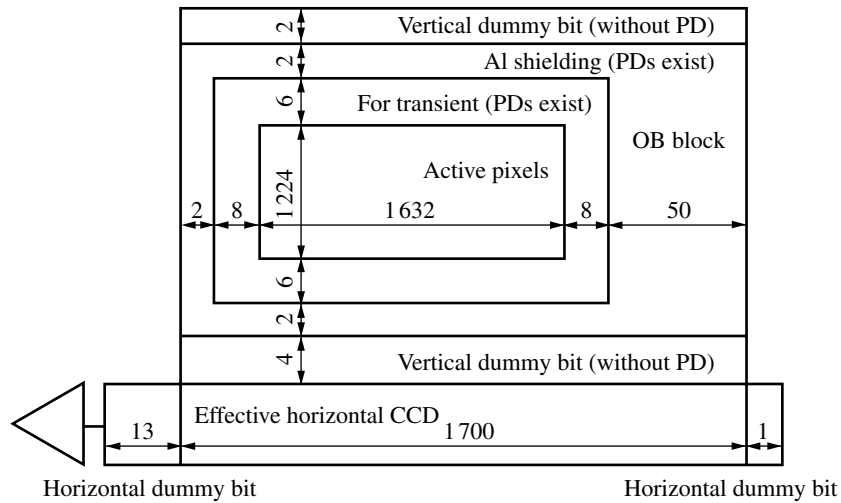
■ Applications

- Digital still camera
- FA, OA cameras

■ Block Diagram



■ Element Construction



■ Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	OD	Output drain	9	PT	P-well for protection circuit
2	RG	Reset gate	10	ϕ_{V5}	Vertical shift register clock pulse 5
3	PW	P-well	11	ϕ_{V6}	Vertical shift register clock pulse 6
4	VO	CCD output	12	ϕ_{V1}	Vertical shift register clock pulse 1
5	LG	Output load transistor gate	13	ϕ_{V2}	Vertical shift register clock pulse 2
6	OG	Output gate	14	ϕ_{V3}	Vertical shift register clock pulse 3
7	ϕ_{H2}	Horizontal shift register clock pulse 2	15	ϕ_{V4}	Vertical shift register clock pulse 4
8	ϕ_{H1}	Horizontal shift register clock pulse 1	16	Sub	Substrate

■ Device Parameter (H × V)

Parameter	Value	Unit
Total pixel number	1 700 × 1 240	pixel
Effective pixel number	1 648 × 1 236	pixel
Active pixel number	1 632 × 1 224	pixel
Image sensing block dimension	5.304 × 3.978	mm ²
Pixel dimension	3.25 × 3.25	μm^2

■ Absolute Maximum Ratings and Operating Conditions

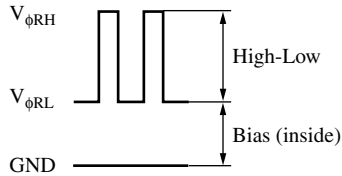
Parameter	Absolute maximum rating		Operating condition			Unit	
	Lower limit	Upper limit	Min	Typ	Max		
V_{OD}	-0.2	18.0	15.0	15.5	16.0	V	
$V_{PT}^{*5,7}$	-10.0	0.2	-8.5	-8.0	-7.5	V	
GND	(Reference voltage)		—	0	—	V	
V_{LG}^{*6}	(Supplied internally)					V	
V_{OG}^{*6}	(Supplied internally)					V	
$V_{\phi R}^{*1}$	High-Low	—	8.0	3.0	3.3	3.6	V
	Bias	-0.5	—	(Supplied internally)			V
$V_{\phi H1}^{*3}$	High	—	8.0	3.0	3.3	3.6	V
	Low	-0.2	—	-0.2	0	0.2	V
$V_{\phi H2}^{*3}$	High	—	8.0	3.0	3.3	3.6	V
	Low	-0.2	—	-0.2	0	0.2	V
V_{Sub}^{*2}	—	—	(Supplied internally)			V	
ϕV_{Sub}^{*2}	-0.2	32.0	22.5	23.5	24.5	V	
$V_{\phi V1}^{*4,5,7}$	High	—	18.0	15.0	15.5	16.0	V
	Middle	—	—	-0.2	0	0.2	V
	Low	-10.0	—	-8.5	-8.0	-7.5	V
$V_{\phi V2}^{*4,5,7}$	Middle	—	15.0	-0.2	0	0.2	V
	Low	-10.0	—	-8.5	-8.0	-7.5	V
$V_{\phi V3}^{*4,5,7}$	High	—	18.0	15.0	15.5	16.0	V
	Middle	—	—	-0.2	0	0.2	V
	Low	-10.0	—	-8.5	-8.0	-7.5	V
$V_{\phi V4}^{*4,5,7}$	Middle	—	15.0	-0.2	0	0.2	V
	Low	-10.0	—	-8.5	-8.0	-7.5	V
$V_{\phi V5}^{*4,5,7}$	High	—	18.0	15.0	15.5	16.0	V
	Middle	—	—	-0.2	0	0.2	V
	Low	-10.0	—	-8.5	-8.0	-7.5	V
$V_{\phi V6}^{*4,5,7}$	High	—	18.0	15.0	15.5	16.0	V
	Middle	—	—	-0.2	0	0.2	V
	Low	-10.0	—	-8.5	-8.0	-7.5	V
Operating temperature	-10	60	—	25	—	°C	
Storage temperature	-30	70	—	—	—	°C	

■ Absolute Maximum Ratings and Operating Conditions (continued)

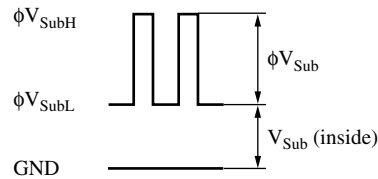
Note) 1. Standard photo detecting condition

Standard photo detecting condition stands for detecting image with a light source of color temperature of 2 856K, luminance of 1050 cd/m², and using a color temperature conversion filter LB-40 (HOYA), infrared cut filter CAW-500S with thickness 2.5 mm for a light path and with F8 lens aperture. The quantity of the incidental light to a photo-detecting surface under the above condition is defined as the standard quantity of light.

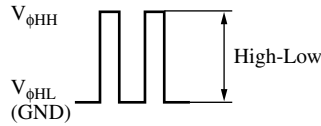
2. *1: Reset



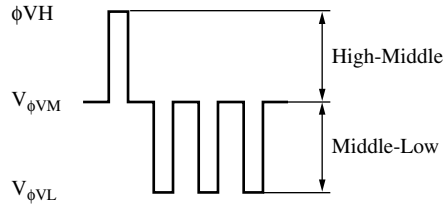
*2: V_{Sub} for electronic shutter



*3: Horizontal transfer pulse ($V_{\phi H}$)



*4: Vertical transfer pulse (readout pulse)



*5: Absolute maximum ratings $-0.2 < V_{\phi V} - V_{PT} < 28.0$ (V)

*6: GND

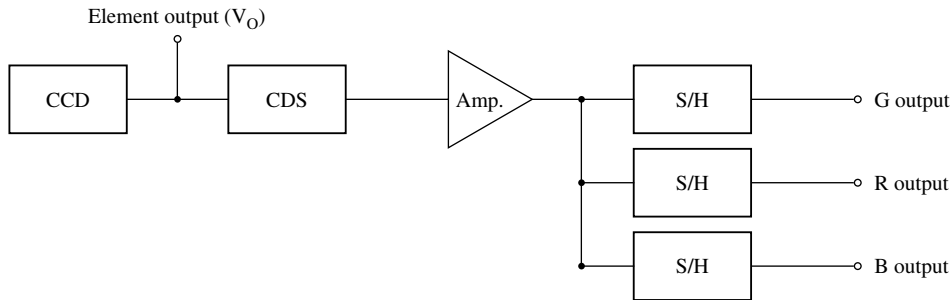
Ground LG and OG pin with each capacitor of 0.047 μ F or more.

*7: Relation between V_{PT} and $V_{\phi VL}$

Set V_{PT} under the following condition against VL of a vertical transfer clock waveform.

$$V_{PT} \leq VL (V_{\phi V1L} \text{ to } V_{\phi V6L})$$

3. Measuring point



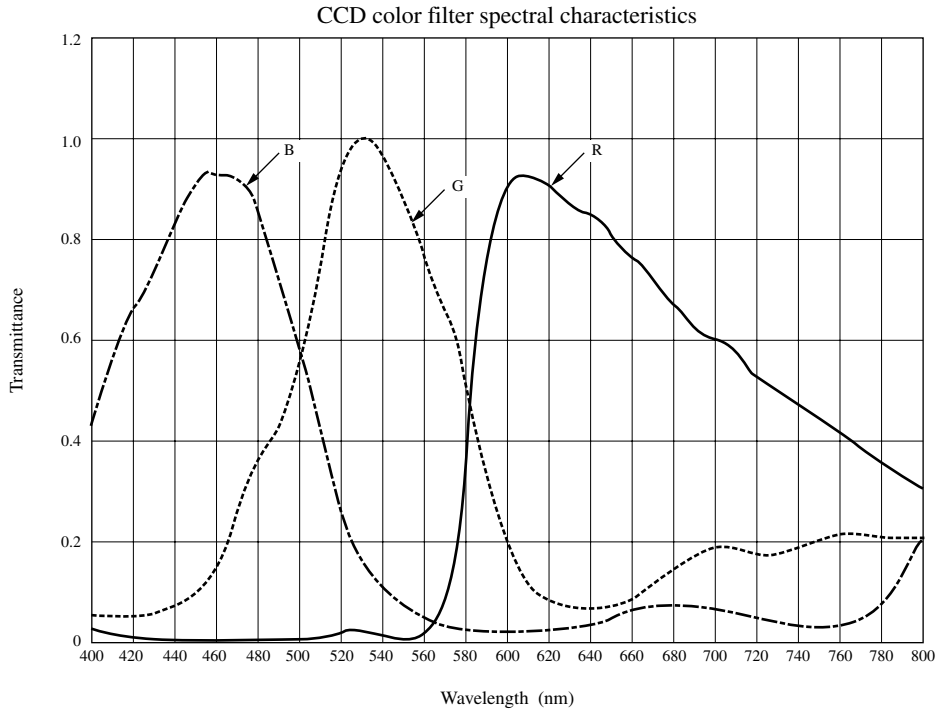
Adjust the amp. gain for 1 regarding V_{O-G} , V_{O-R} and V_{O-B} outputs.

■ Optical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Sensitivity	SoG	J chart F8	—	260	—	mV
Saturation output	V_{sat}	J chart F1.4	—	420	—	mV
Vertical smear	Sm	Frame readout mode	—	-84	—	dB
		Monitor readout mode	—	-72	—	dB

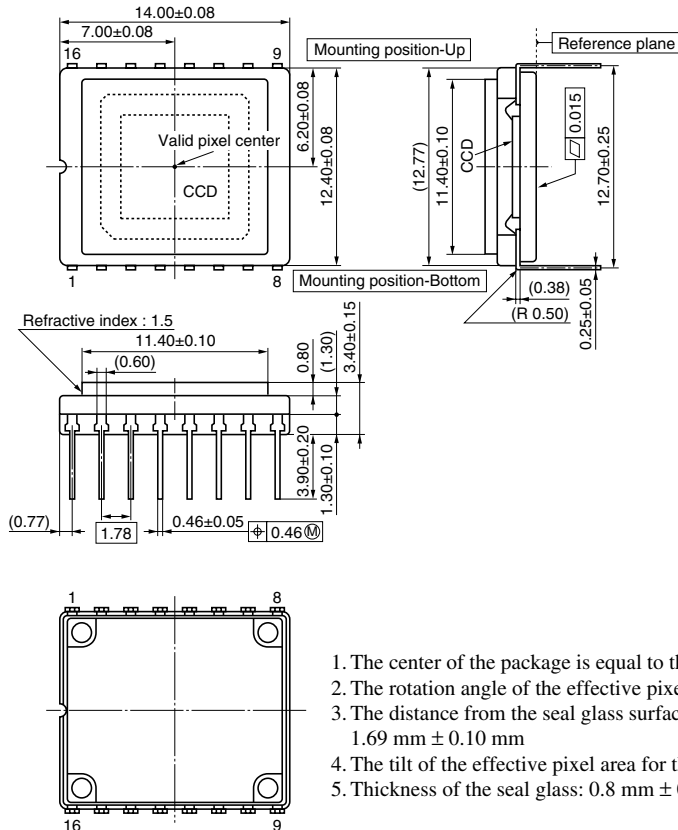
Note) The above-mentioned characteristics are the values on 1/7.5 seconds frame rate.

■ Graph of Characteristics



■ Package Dimensions (unit: mm)

- WDIP016-P-0500C



MN39471PT

Diagonal 6.9 mm (type-1/3) 2.31M-pixel CCD Area Image Sensor

■ Overview

The MN39471PT is a super high resolution CCD area image sensor which includes 2.31M-pixel in type-1/3 image format size.

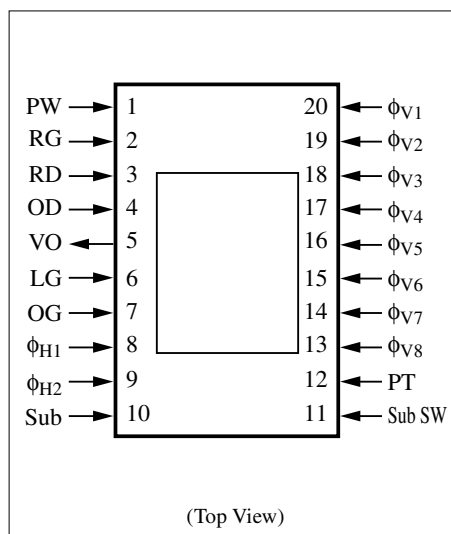
Adopting RGB Bayer arrangement in primary color filter array on chip provides excellent color reproduction. As the aspect ratio of image area is 3:2 which is the same as that of 35mm film, pictures can be taken in similar framing manner to use of a usual film camera.

As The MN39471PT has also a skipping readout mode for image monitoring by LCD panel, you can fix the composition in real time.

Part Number	Size	Scanning mode	Color or B/W
MN39471PT	6.9 mm (type-1/3)	IS *	Color

Note) Interlace scan

■ Pin Assignments



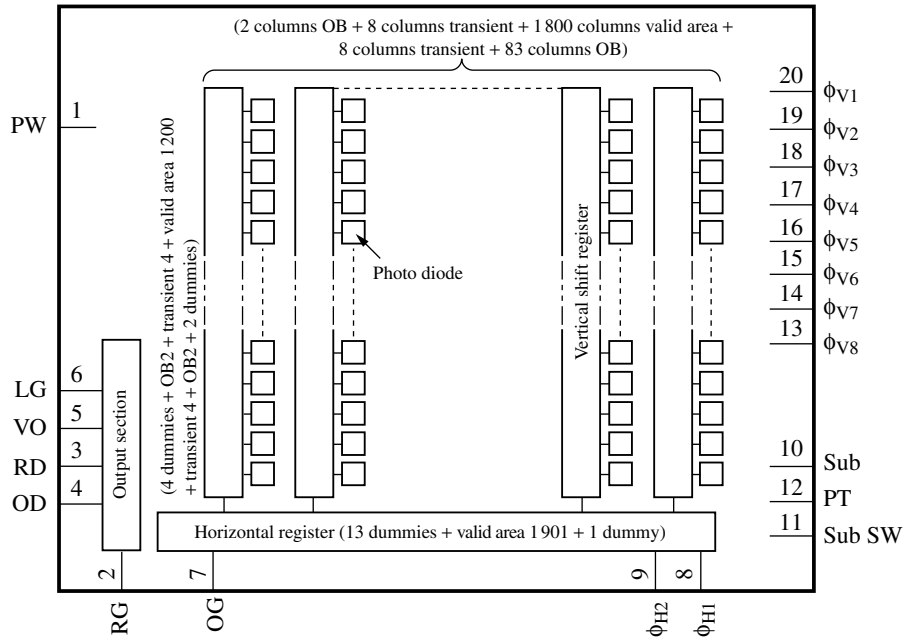
■ Features

- Photographic grade super high resolution by 2.31M-pixel in type-1/3 format
- Responds to 5 : 1 skipping readout mode for LCD monitoring
- The same aspect ratio of 3 : 2 as a 35 mm film
- Newly developed small plastic package

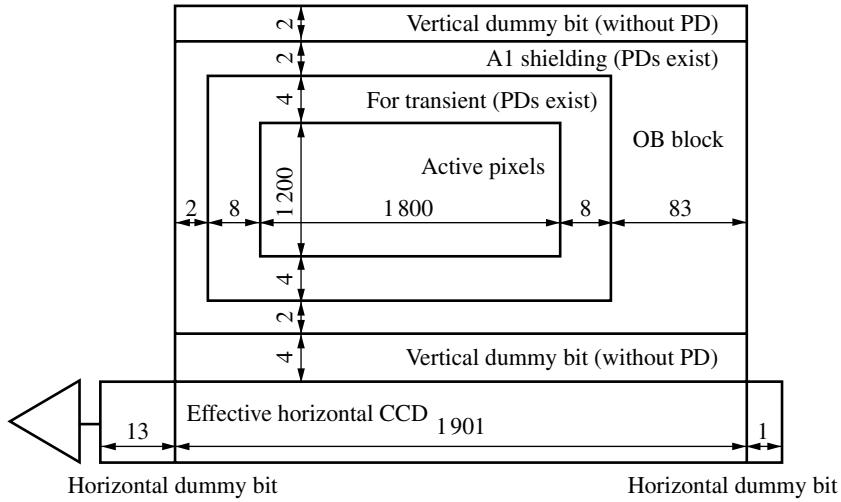
■ Applications

- Digital still camera
- FA, OA cameras

■ Block Diagram



■ Element Construction



■ Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	PW	P-well	11	SubSW	Substrate potential control
2	RG	Reset gate	12	PT	P-well for protection circuit
3	RD	Reset drain	13	ϕ_{V8}	Vertical shift register clock pulse 8
4	OD	Output drain	14	ϕ_{V7}	Vertical shift register clock pulse 7
5	VO	CCD output	15	ϕ_{V6}	Vertical shift register clock pulse 6
6	LG	Output load transistor gate	16	ϕ_{V5}	Vertical shift register clock pulse 5
7	OG	Output gate	17	ϕ_{V4}	Vertical shift register clock pulse 4
8	ϕ_{H1}	Horizontal shift register clock pulse 1	18	ϕ_{V3}	Vertical shift register clock pulse 3
9	ϕ_{H2}	Horizontal shift register clock pulse 2	19	ϕ_{V2}	Vertical shift register clock pulse 2
10	Sub	Substrate	20	ϕ_{V1}	Vertical shift register clock pulse 1

■ Device Parameter (H × V)

Parameter	Value	Unit
Total pixel number	1 901 × 1 212	pixel
Effective pixel number	1 816 × 1 208	pixel
Active pixel number	1 800 × 1 200	pixel
Image sensing block dimension	5.76 × 3.84	mm ²
Pixel dimension	3.2 × 3.2	μm^2

■ Absolute Maximum Ratings and Operating Conditions

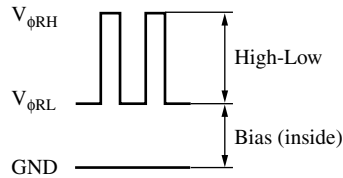
Parameter	Symbol	Rating		Operating condition			Unit	
		Min	Max	Min	Typ	Max		
Output drain voltage	V_{OD}	-0.2	18.0	15.0	15.5	16.0	V	
Reset drain voltage	V_{RD}	-0.2	18.0	15.0	15.5	16.0	V	
Protection P-well voltage ^{*5, 7}	V_{PT}	-10.0	0.2	-8.5	-8.0	-7.5	V	
P-well voltage	V_{PW}	Reference voltage		—	0	—	V	
Output load transistor gate voltage ^{*6}	V_{LG}	—	—	Supplied internally			V	
Output gate voltage ^{*6}	V_{OG}	—	—	Supplied internally			V	
Reset pulse voltage ^{*1}	High-Low	$V_{\phi R}$	—	8.0	3.0	3.3	3.6	V
	Bias		-0.5	—	Supplied internally			
Horizontal register clock pulse voltage 1 ^{*3}	High	$V_{\phi H1}$	—	8.0	3.0	3.3	3.6	V
	Low		-0.2	—	-0.2	0	0.2	
Horizontal register clock pulse voltage 2 ^{*3}	High	$V_{\phi H2}$	—	8.0	3.0	3.3	3.6	V
	Low		-0.2	—	-0.2	0	0.2	
Substrate voltage ^{*2}		V_{Sub}	—	—	Supplied internally			V
		ϕV_{Sub}	-0.2	35.5	25.0	26.0	27.0	
For electronic shutter substrate potential control voltage	High	SubSW	—	8.0	3.0	3.3	3.6	V
	Low		-0.2	—	-0.2	0	+0.2	
Vertical shift register clock pulse voltage 1, 5 ^{*4, 5, 7}	High	$V_{\phi V1}$	—	18.0	15.0	15.5	16.0	V
	Middle	$V_{\phi V5}$	—	—	-0.2	0	0.2	
	Low		-10.0	—	-8.5	-8.0	-7.5	
Vertical shift register clock pulse voltage 2, 6 ^{*4, 5, 7}	Middle	$V_{\phi V2}$	—	15.0	-0.2	0	0.2	V
	Low	$V_{\phi V6}$	-10.0	—	-8.5	-8.0	-7.5	
Vertical shift register clock pulse voltage 3, 7 ^{*4, 5, 7}	High	$V_{\phi V3}$	—	18.0	15.0	15.5	16.0	V
	Middle	$V_{\phi V7}$	—	-0.2	0	0.2		
	Low		-10.0	—	-8.5	-8.0	-7.5	
Vertical shift register clock pulse voltage 4, 8 ^{*4, 5, 7}	Middle	$V_{\phi V4}$	—	15.0	-0.2	0	0.2	V
	Low	$V_{\phi V8}$	-10.0	—	-8.5	-8.0	-7.5	
Operating temperature	T_{opr}	-10	60	—	25	—	°C	
Storage temperature	T_{stg}	-30	70	—	—	—	°C	

■ Absolute Maximum Ratings and Operating Conditions (continued)

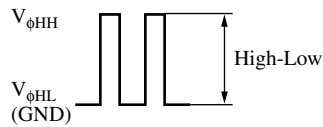
Note) 1. Standard photo detecting condition

Standard photo detecting condition stands for detecting image with a light source of color temperature of 2 856K, luminance of 1 050 cd/m², and using a color temperature conversion filter LB-40 (HOYA), infrared cut filter CAW-500S with thickness 2.5 mm for a light path and with F8 lens aperture. The quantity of the incidental light to a photo-detecting surface under the above condition is defined as the standard quantity of light.

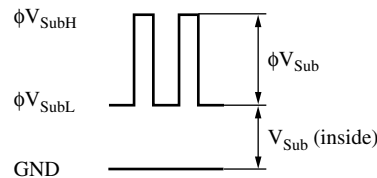
2.*1: Reset



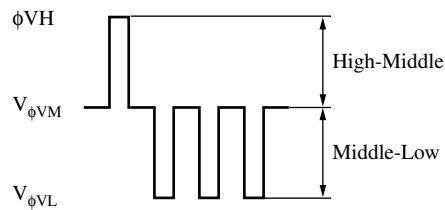
*3: Horizontal transfer pulse ($V_{\phi H}$)



*2: V_{Sub} for electronic shutter



*4: Vertical transfer pulse (readout pulse)



*5: Absolute maximum ratings $-0.2 < V_{\phi V} - V_{PT} < 28.0$ (V)

*6: GND

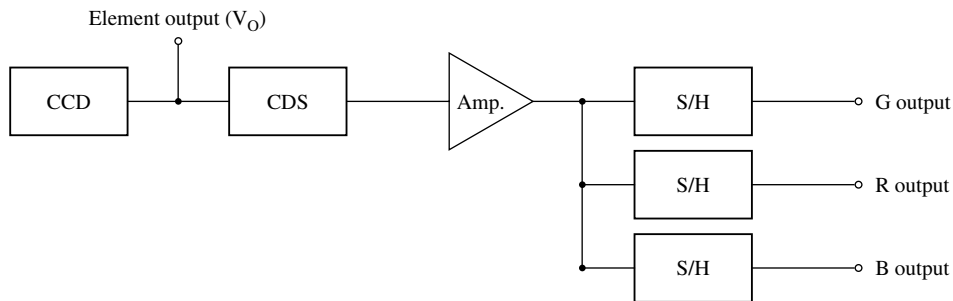
Ground LG and OG pin with each capacitor of 0.047 μF or more.

*7: Relation between V_{PT} and $V_{\phi VL}$

Set V_{PT} under the following condition against VL of a vertical transfer clock waveform.

$$V_{PT} \leq VL (V_{\phi V1L} \text{ to } V_{\phi V8L})$$

3. Measuring point



Adjust the amp. gain for 1 regarding V_{O-G} , V_{O-R} and V_{O-B} outputs.

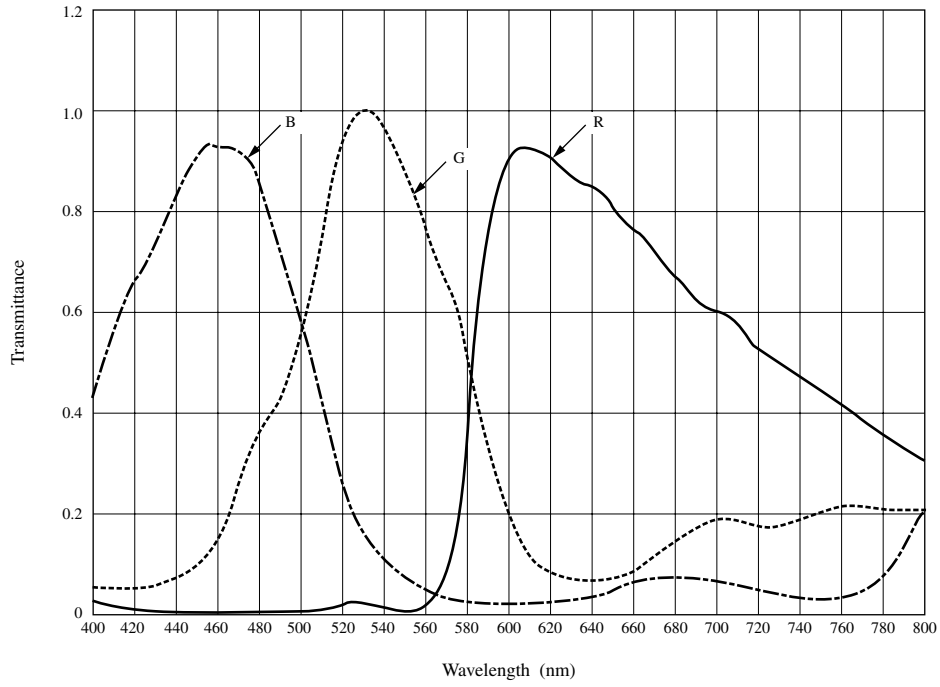
■ Optical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Sensitivity	SoG	J chart F8	—	250	—	mV
Saturation output	V_{sat}	J chart F1.4	—	420	—	mV
Vertical smear	Sm	Frame readout mode	—	-84	—	dB

Note) The above-mentioned characteristics are the values on 1/7.5 seconds frame rate.

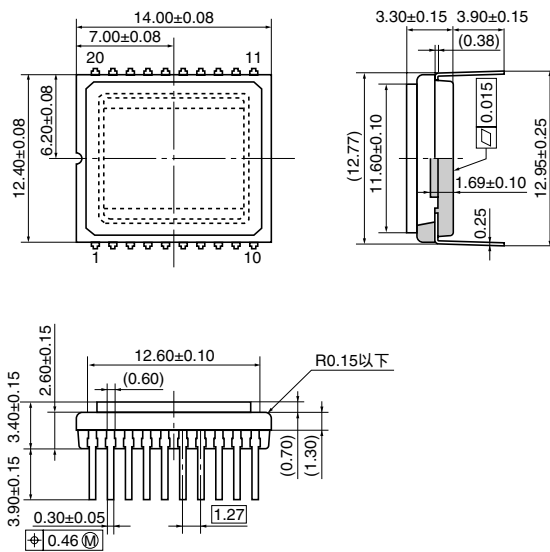
■ Graphs of Characteristics

CCD Color Filter Spectral Characteristics



■ Package Dimensions (Unit: mm)

- WDIP020-P-0500A



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