MW39540AE

Diagonal 11 mm (type-2/3) IT CCD Area Image Sensor

■ Overview

The MW39540AE is a type-2/3 520k-pixel CCD solid state image sensor.

This device uses photodiodes in the opto-electric conversion section and CCDs for signal read-out. The electronic shutter function allows for an exposure time of 1/10000 seconds. Further, it features high sensitivity, low noise, broad dynamic range and low smear level.

The device has a total of 2515100 pixels (1020 horizontal × 505 vertical) and provides stable and clear images with a resolution of 720 horizontal and 350 vertical TV lines.

Part Number	CCD size	System	Color or B/W
MW39540AE	11 mm (type-2/3)	EIA	B/W

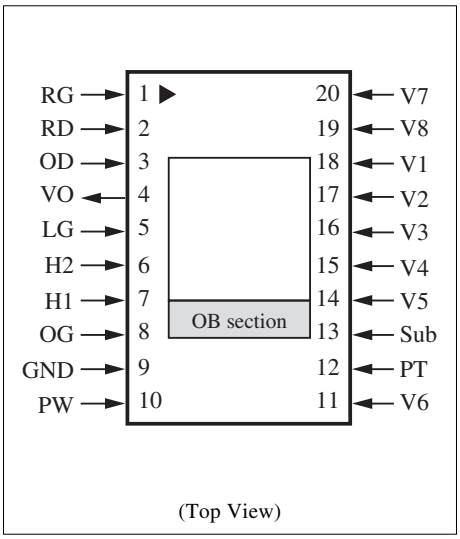
■ Features

- Effective pixel number: 966 (horizontal) × 492 (vertical)
- High sensitivity
- High resolution
- Low smear level
- Continuously variable-speed electronic shutter function

■ Applications

- Three-chip CCD color video camera supporting a widescreen-TV

■ Pin Assignments

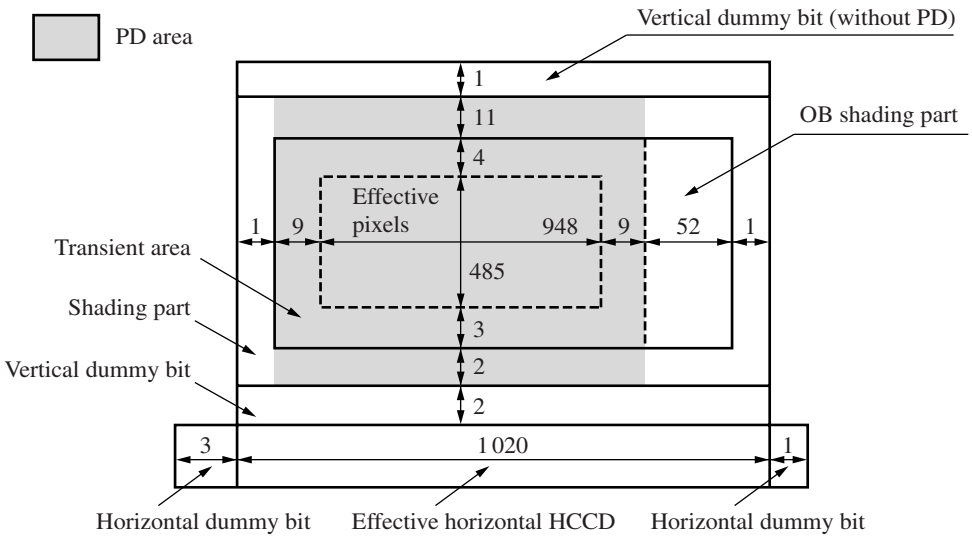


(Top View)

■ Device Configuration

Parameter	Value	Unit
Horizontal drive frequency	f_{CK} = 1 144 f_H = 18.0	MHz
Total pixel number	1 020 (H) × 505 (V)	Pixel
Effective pixel number (including transient ones)	966 (H) × 492 (V)	Pixel
Effective pixel number	948 (H) × 485 (V)	Pixel
Pixel size	10.0 (H) × 11.0 (V)	mm^2
Effective image sensor size	9.480 (H) × 5.335 (V)	mm^2
Aspect ratio	16 : 9.004	H : V
Aspect ratio error	0.04	%

• Element Construction



■ Pin Descriptions

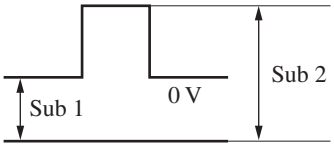
Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	RG	Reset gate	11	V6	Vertical shift register clock pulse 6
2	RD	Reset drain	12	PT	P-well for protection circuit
3	OD	Output drain	13	Sub	Substrate
4	VO	Video output	14	V5	Vertical shift register clock pulse 5
5	LG	Output load transistor gate	15	V4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

■ Absolute Maximum Ratings and Operating Conditions

Parameter		Absolute maximum rating		Operating condition			Unit
		Lower limit	Upper limit	Min	Typ	Max	
RG	High	0	9	4.7	5.0	5.3	V
	Low	0	—	6.7	7.0	7.3	V
RD		0	18	15.7	16.0	16.3	V
OD		0	18	15.7	16.0	16.3	V
VO		—	—	—	—	—	V
LG		0	5	2.7	3.0	3.3	V
ϕ_{H2}	High	—	10	4.7	5.0	5.3	V
	Low	0	—	0	0	0.3	V
ϕ_{H1}	High	—	10	4.7	5.0	5.3	V
	Low	0	—	0	0	0.3	V
OG		0	5	0.3	0.5	1.0	V
GND		Reference voltage		—	0	—	V
PW		Reference voltage		—	0	—	V
ϕ_{V6}	Middle	—	5	– 0.3	0	0.3	V
	Low	–12	—	–9.3	–9.0	–8.7	V
PT		–13.2	ϕ_{VL}	ϕ_{VL} – 1.2	ϕ_{VL} – 1.0	ϕ_{VL} – 0.7	V
Sub 1 *		0	18	5.0	adj.	14.5	V
Sub 2 *		0	45	24.5	25 + Sub 1	40.0	V
ϕ_{V5}	High	—	18	15.7	16.0	16.3	V
	Middle	—	5	– 0.3	0	0.3	V
	Low	–12	—	–9.3	–9.0	–8.7	V
ϕ_{V4}	Middle	—	5	– 0.3	0	0.3	V
	Low	–12	—	–9.3	–9.0	–8.7	V
ϕ_{V3}	Middle	—	5	– 0.3	0	0.3	V
	Low	–12	—	–9.3	–9.0	–8.7	V
ϕ_{V2}	Middle	—	5	– 0.3	0	0.3	V
	Low	–12	—	–9.3	–9.0	–8.7	V
ϕ_{V1}	High	—	18	15.7	16.0	16.3	V
	Middle	—	5	– 0.3	0	0.3	V
	Low	–12	—	–9.3	–9.0	–8.7	V
ϕ_{V8}	Middle	—	5	– 0.3	0	0.3	V
	Low	–12	—	–9.3	–9.0	–8.7	V
ϕ_{V7}	Middle	—	5	– 0.3	0	0.3	V
	Low	–12	—	–9.3	–9.0	–8.7	V
Operating temperature		–10	60	—	25	—	°C
Storage temperature		–30	70	—	—	—	°C

■ Absolute Maximum Ratings and Operating Conditions (continued)

Note) ∗: Sub pulse at the electronic shutter



■ Image Sensor Characteristics

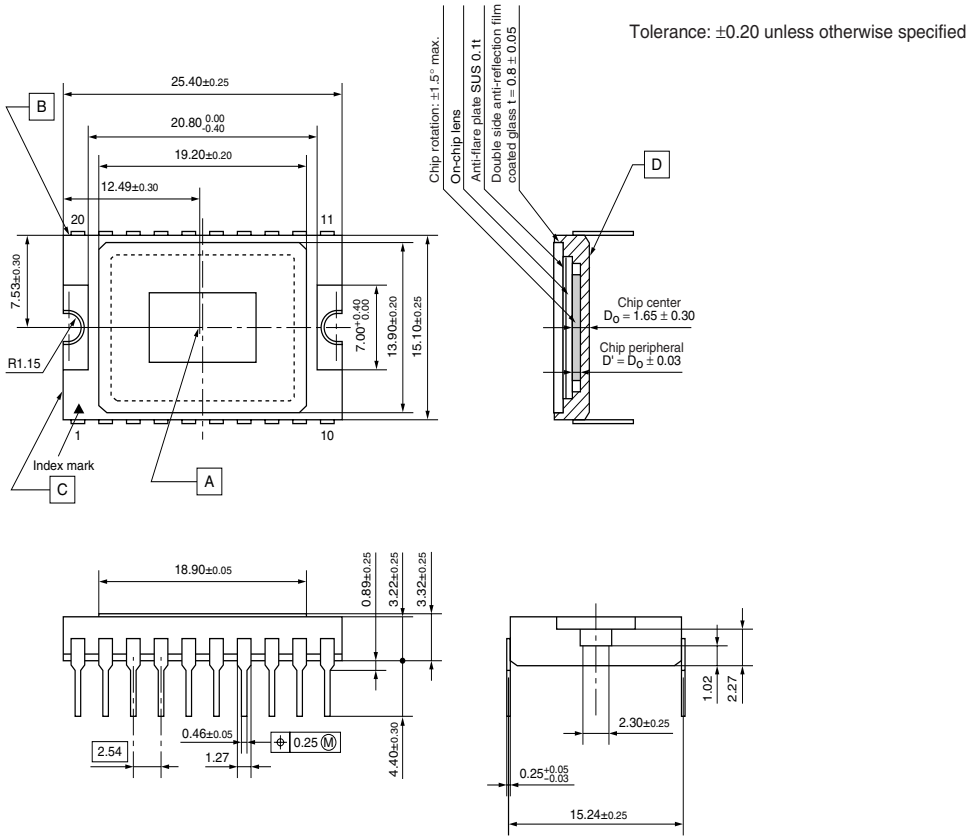
Parameter	Conditions	Min	Typ	Max	Unit	Remarks
S/N	25°C, Dark condition	63	64.5	—	dB	Standard output
Saturation output	25°C, F value adjust	1 500	—	—	mV	at CCD out
Standard output	25°C, J chart standard light intensity	560	620	—	mV	at CCD out
Image lag	25°C, 1/10 light intensity	—	0	—	%	Able to be swept out directly to substrate
Vertical smear	25°C, 1/10 V, F1.4	—	−130	−120	dB	Standard output
Transfer efficiency	25°C, F11 + 1/32ND	Resolution should not be reduced.				
Electronic shutter	25°C, Specified driving	No abnormality within 1/100 to 1/2 000 seconds				

Note) 1. The substrate voltage (Sub 1) should be adjusted to the minimum voltage that would not cause blooming, overflow and injection at image sensor of light input of 12 800 times the standard light intensity.

2. The standard light intensity is the one when the exposure is done at an aperture of F/11 using a light source of 2 856K and 920 nt and placing a color temperature conversion filter LB-40 (HOYA) and an IR cutting filter CAW-500S (t = 2.5 mm) in the light path.

■ Package Dimensions (unit: mm)

• WDIP020-G-0600D (Lead-free package)



1. The package center does not meet the center of the effective pixel area. A is the center of the effective pixel area.
2. The reference of a vertical direction(V) is the side B. The reference of a horizontal direction(H) is the side C. The reference of a height direction is the package bottom D.
3. The rotation precision of the effective pixel area: maximum ±1.5°
4. The distance from the package bottom D to the effective pixel area : 1.65 mm ± 0.3 mm
5. The tilt of the effective pixel area toward the package bottom D : Up to 60 µm (D' = D_O ± max. 0.03 mm)
6. The thickness of the seal glass: 0.8 mm ± 0.1 mm, and the refractive index: 1.50

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