

# MW39962AE

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

### ■ Overview

The MW39962AE is a type-2/3 2.2M-pixel frame inter-line transfer (FIT-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 2 182 860 pixels (2010 horizontal × 1 086 vertical) and provides stable and clear images with a resolution of 1 100 horizontal and 730 vertical TV lines.

Part Number	CCD size	System	Color or B/W
MW39962AE	11 mm (type-2/3)	HDTV	B/W

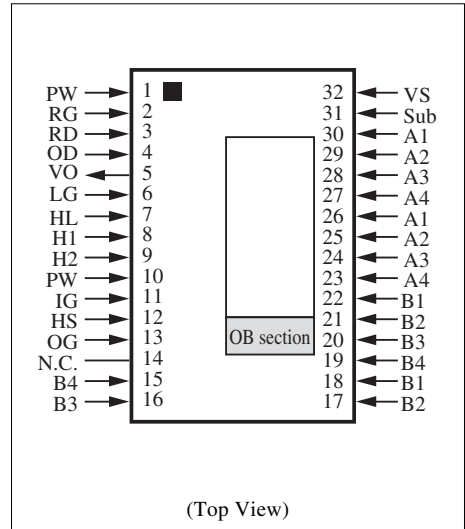
### ■ Features

- Effective pixel number: 1 936 (horizontal) × 1 086 (vertical)
- High sensitivity
- High resolution
- Low smear level
- Continuously variable-speed electronic shutter function
- Frame interline transfer system

### ■ Applications

- Broadcasting and professional use camera
- Front-edge surveillance camera

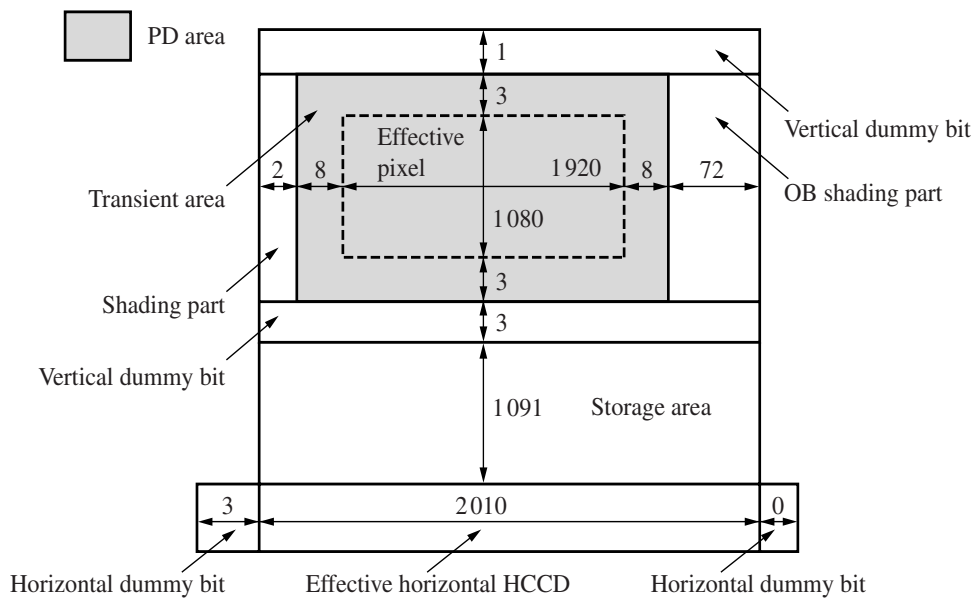
### ■ Pin Assignments



## ■ Device Configuration

Parameter	Value	Unit
Horizontal drive frequency	$f_{CK} = 2200 f_H = 74.25$	MHz
Total pixel number	2010 (H) × 1086 (V)	Pixel
Effective pixel number (including transient ones)	1936 (H) × 1086 (V)	Pixel
Effective pixel number	1920 (H) × 1080 (V)	Pixel
Pixel size	5.0 (H) × 5.0 (V)	$\mu\text{m}^2$
Effective image sensor size	9.6 (H) × 5.4 (V)	$\text{mm}^2$
Aspect ratio	16 : 9	H : V
Aspect ration error	0.0	%

## • Element Construction



Note) The horizontal dummy bit is based on 2 gates = 1 unit.

## ■ Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	PW	P-well	11	IG	Horizontal input gate
2	RG	Reset gate	12	HS	Horizontal input source
3	RD	Reset drain	13	OG	Output gate
4	OD	Output drain	14	N.C.	Non Connection
5	VO	Video output	15	B4	Storage area vertical CCD gate 4
6	LG	Output load transistor gate	16	B3	Storage area vertical CCD gate 3
7	HL	Horizontal CCD final gate	17	B2	Storage area vertical CCD gate 2
8	H1	Horizontal CCD gate 1	18	B1	Storage area vertical CCD gate 1
9	H2	Horizontal CCD gate 2	19	B4	Storage area vertical CCD gate 4
10	PW	P-well	20	B3	Storage area vertical CCD gate 3

### ■ Pin Descriptions (continued)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
21	B2	Storage area vertical CCD gate 2	27	A4	Sensor area vertical CCD gate 4
22	B1	Storage area vertical CCD gate 1	28	A3	Sensor area vertical CCD gate 3
23	A4	Sensor area vertical CCD gate 4	29	A2	Sensor area vertical CCD gate 2
24	A3	Sensor area vertical CCD gate 3	30	A1	Sensor area vertical CCD gate 1
25	A2	Sensor area vertical CCD gate 2	31	Sub	Substrate
26	A1	Sensor area vertical CCD gate 1	32	VS	Vertical input source

### ■ Absolute Maximum Ratings and Operating Conditions

Pin No.	Parameter		Absolute maximum rating		Operating condition			Unit
			Lower limit	Upper limit	Min	Typ	Max	
1	PW		Reference voltage		—	0.0	—	V
2	RG	Amplitude	0	9.0	4.7	5.0	5.3	V
		Low	0	—	1.0	adj.	8.0	V
3	RD		0	18	14.3	14.5	14.7	V
4	OD		0	18	14.3	14.5	14.7	V
5	VO		—	—	—	—	—	V
6	LG		0	6	1.0	adj.	4.0	V
7	$\phi_{HL}$	High	—	10	2.7	3.0	3.3	V
		Low	0	—	0.0	0.0	0.3	V
8	$\phi_{H1}$	High	—	10	2.7	3.0	3.3	V
		Low	0	—	0.0	0.0	0.3	V
9	$\phi_{H2}$	High	—	10	2.7	3.0	3.3	V
		Low	0	—	0.0	0.0	0.3	V
10	PW		Reference voltage		—	0.0	—	V
11	IG		0	5	—	0.0	—	V
12	HS		0	18	15.7	16.0	16.3	V
13	OG		0	5	0.0	adj.	0.3	V
14	N.C.		—	—	—	—	—	—
15	$\phi_{B4}$	Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-9.3	-9.0	-8.7	V
16	$\phi_{B3}$	Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-9.3	-9.0	-8.7	V
17	$\phi_{B2}$	Middle	—	18	-0.3	0	0.3	V
		Low	-12	—	-9.3	-9.0	-8.7	V
18	$\phi_{B1}$	Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-9.3	-9.0	-8.7	V
19	$\phi_{B4}$	Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-9.3	-9.0	-8.7	V

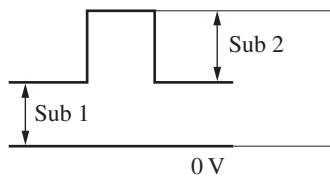
### ■ Absolute Maximum Ratings and Operating Conditions (continued)

Pin No.	Parameter		Absolute maximum rating		Operating condition			Unit
			Lower limit	Upper limit	Min	Typ	Max	
20	$\phi_{B3}$	Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-9.3	-9.0	-8.7	V
21	$\phi_{B2}$	Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-9.3	-9.0	-8.7	V
22	$\phi_{B1}$	Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-9.3	-9.0	-8.7	V
23	$\phi_{A4}$	Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-8.3	-8.0	-7.7	V
24	$\phi_{A3}$	High	—	18	14.7	15.0	15.3	V
		Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-8.3	-8.0	-7.7	V
25	$\phi_{A2}$	Middle	—	18	0.7	1.0	1.3	V
		Low	-12	—	-8.3	-8.0	-7.7	V
26	$\phi_{A1}$	High	—	18	14.7	15.0	15.3	V
		Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-8.3	-8.0	-7.7	V
27	$\phi_{A4}$	Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-8.3	-8.0	-7.7	V
28	$\phi_{A3}$	High	—	18	14.7	15.0	15.3	V
		Middle	—	18	-0.3	0.0	0.3	V
		Low	-12	—	-8.3	-8.0	-7.7	V
29	$\phi_{A2}$	Middle	—	18	0.7	1.0	1.3	V
		Low	-12	—	-8.3	-8.0	-7.7	V
30	$\phi_{A1}$	High	—	18	14.7	15.0	15.3	V
		Middle	—	18	-0.3	0	0.3	V
		Low	-12	—	-8.3	-8.0	-7.7	V
31	Sub *1	1	0	40 *2	3.0	adj.	14.0	V
		2	0		24.0	25.0	26.0	V
32	VS		0	18	15.7	16.0	16.3	V
Operating temperature			-10	60	—	25	—	°C
Storage temperature			-30	70	—	—	—	°C

Note) \*1 : Sub pulse at the electronic shutter

\*2 : Upper limit of Sub maximum rating:

$$\text{Sub 1} + \text{Sub 2} \leq 40 \text{ V}$$



## Image Sensor Characteristics $T_a = 25^\circ\text{C}$

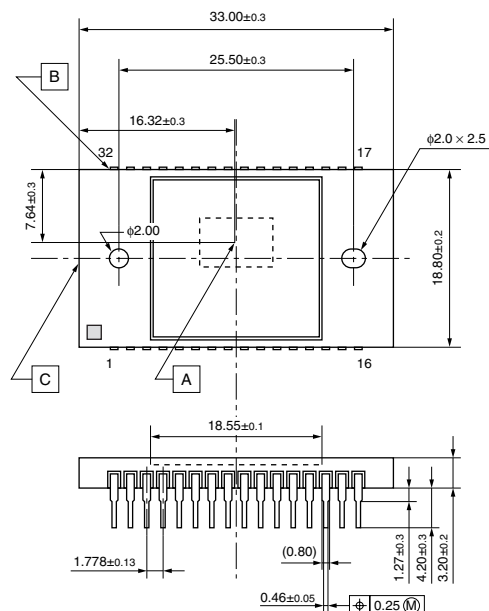
Parameter	Conditions	Min	Typ	Max	Unit	Remarks	
Saturation output	F value adjust	650	800	—	mV	at CCD out (Minimum point in image)	
Standard output	J chart standard light intensity	140	155	—	mV	at CCD out	
Image lag	1/10 light intensity	—	0	—	%	Able to be swept out directly to substrate	
Vertical smear	1/10 V	—	-127	-124	dB	Ratio to standard output 2 MHz driving	
Dark shading	H	60°C, dark condition	—	—	2	mV	at CCD out
	V						
Electronic shutter	Specified driving	No abnormality within 1/100 to 1/2000 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 1 600 times the standard light intensity.

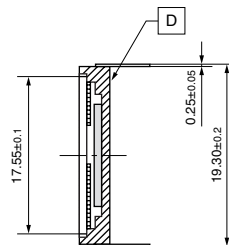
2. The standard light intensity is the one when the exposure is done at an aperture of F/11 using a light source of 2856K and 920 nt and placing a color temperature conversion filter LB-40 (HOYA) and an IR cutting filter CAW-500S ( $t = 2.5$  mm) in the light path.

## Package Dimensions (unit: mm)

### • WDIP032-G-0750A (Lead-free package)



Tolerance:  $\pm 0.20$  unless otherwise specified



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  $\pm 1.5^\circ$
4. The distance from the package bottom D to the effective pixel area :  $1.69 \text{ mm} \pm 0.3 \text{ mm}$
5. The tilt of the effective pixel area toward the package bottom D : Up to  $60 \mu\text{m}$  ( $D' = D_0 \pm \text{max. } 0.03 \text{ mm}$ )
6. The thickness of the seal glass is:  $0.7 \text{ mm} \pm 0.1 \text{ mm}$ , and the refractive index: 1.50

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