MN39116AT

Diagonal 4.5 mm (type-1/4) 270k-pixel CCD Area Image Sensor

■ Overview

The MN39116AT is a 4.5 mm (type-1/4) interline transfer CCD (IT-CCD) solid state image sensor device.

This device uses photodiodes in the optoelectric conversion section and CCDs for signal readout. The electronic shutter function has made an exposure time of 1/10000 seconds possible. Further, this device has the features of high sensitivity, low noise, broad dynamic range, and low smear.

This device has a total of 267 206 pixels (542 horizontal × 493 vertical) and provides stable and clear images with a resolution of 360 horizontal TV-lines and 350 vertical TV-lines.

Part Number	Size	System	Color or B/W
MN39116AT	4.5 mm (type-1/4)	EIA	B/W

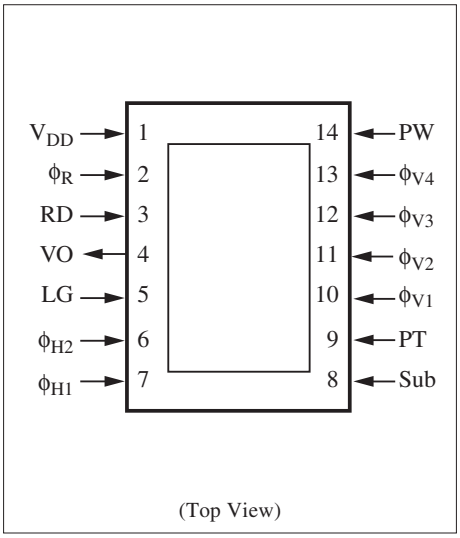
■ Features

- Effective pixel number 512 (horizontal) × 491 (vertical)
- High sensitivity
- Broad dynamic range
- Low smear
- Electronic shutter

■ Applications

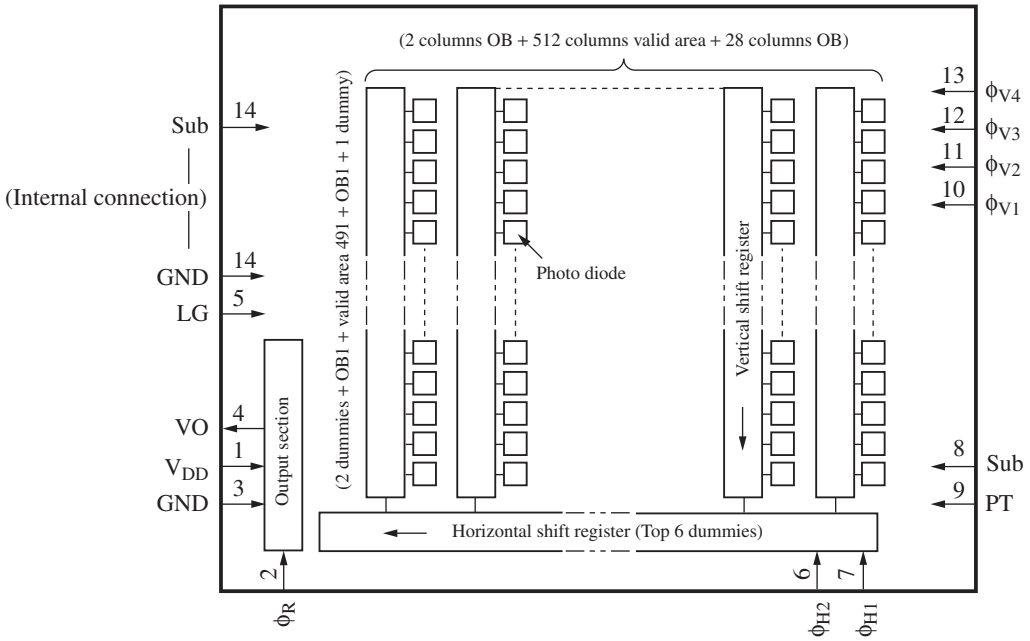
- Surveillance cameras
- FA, OA cameras

■ Pin Assignments



(Top View)

■ Block Diagram



■ Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	V_{DD}	Power supply	8	Sub	Substrate
2	ϕ_R	Reset pulse (RG)	9	PT	P-well for protection circuit
3	RD	Reset drain	10	ϕ_{V1}	Vertical shift register clock pulse 1
4	VO	Video output	11	ϕ_{V2}	Vertical shift register clock pulse 2
5	LG	Output load transistor gate	12	ϕ_{V3}	Vertical shift register clock pulse 3
6	ϕ_{H2}	Horizontal register clock pulse 2	13	ϕ_{V4}	Vertical shift register clock pulse 4
7	ϕ_{H1}	Horizontal register clock pulse 1	14	PW	P-well

■ Device Parameter (H × V)

Parameter	Value	Unit
Pixel number *	512 × 491	pixel
Image sensing block dimension	3.6144 × 2.716	mm^2
Pixel dimension	7.2 × 5.6	μm^2

Note) *: OB columns are not included.

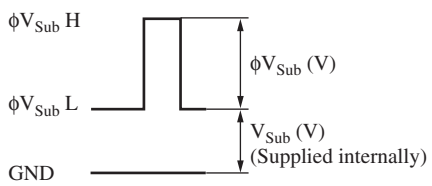
■ Absolute Maximum Ratings and Operating Conditions

Parameter		Absolute maximum rating		Operating condition			Unit
		Lower limit	Upper limit	Min	Typ	Max	
V_{DD}		– 0.2	18.0	14.5	15.0	15.5	V
V_{RD}		– 0.2	18.0	14.5	15.0	15.5	V
V_{PT} *3, 4		–10.0	0.2	–8.3	–8.0	–7.7	V
GND		(Referene voltage)		—	0	—	V
V_{LG} *6		(Supplied internally)					V
V_{OG}		(Supplied internally)					V
$V_{\phi R}$	High-Low	—	8.0	3.0	3.3	5.3	V
	Bias	(Supplied internally)					V
$V_{\phi H1}$	High	—	8.0	3.0	3.3	5.3	V
	Low	– 0.2	—	– 0.05	0	0.05	V
$V_{\phi H2}$	High	—	8.0	3.0	3.3	5.3	V
	Low	– 0.2	—	– 0.05	0	0.05	V
V_{Sub} *2		(Supplied internally)					V
ϕV_{Sub} *1		– 0.2	45.0	22.5	23.0	23.5	V
$V_{\phi V1}$ *3, 4, 5	High	—	18.0	14.5	15.0	15.5	V
	Middle	—	—	– 0.2	0	0.2	V
	Low	–9.0	—	–8.3	–8.0	–7.7	V
$V_{\phi V2}$ *3, 4, 5	Middle	—	15.0	– 0.2	0	0.2	V
	Low	–9.0	—	–8.3	–8.0	–7.7	V
$V_{\phi V3}$ *3, 4, 5	High	—	18.0	14.5	15.0	15.5	V
	Middle	—	—	– 0.2	0	0.2	V
	Low	–9.0	—	–8.3	–8.0	–7.7	V
$V_{\phi V4}$ *3, 4, 5	Middle	—	15.0	– 0.2	0	0.2	V
	Low	–9.0	—	–8.3	–8.0	–7.7	V
Operating temperature		–10	60	—	25	—	°C
Storage temperature		–30	80	—	—	—	°C

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/m^2, 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: V_{Sub} when using electronic shutter function



■ Absolute Maximum Ratings and Operating Conditions (continued)

Note) 2. ∗2: V_{Sub} supplied internally is the voltage suppressing the blooming generation at ×1 000 light quantity relative to the standard light quantity.

∗3: Relation between V_{PT} and $V_{\phi VL}$

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

$V_{PT} \leq VL$ ($V_{\phi V1L}$ to $V_{\phi V4L}$)

∗4: Absolute maximum ratings $-0.2 < V_{Sub} - V_{PT} < 55$ (V)

$-0.2 < V_{\phi V} - V_{PT} < 24.5$ (V)

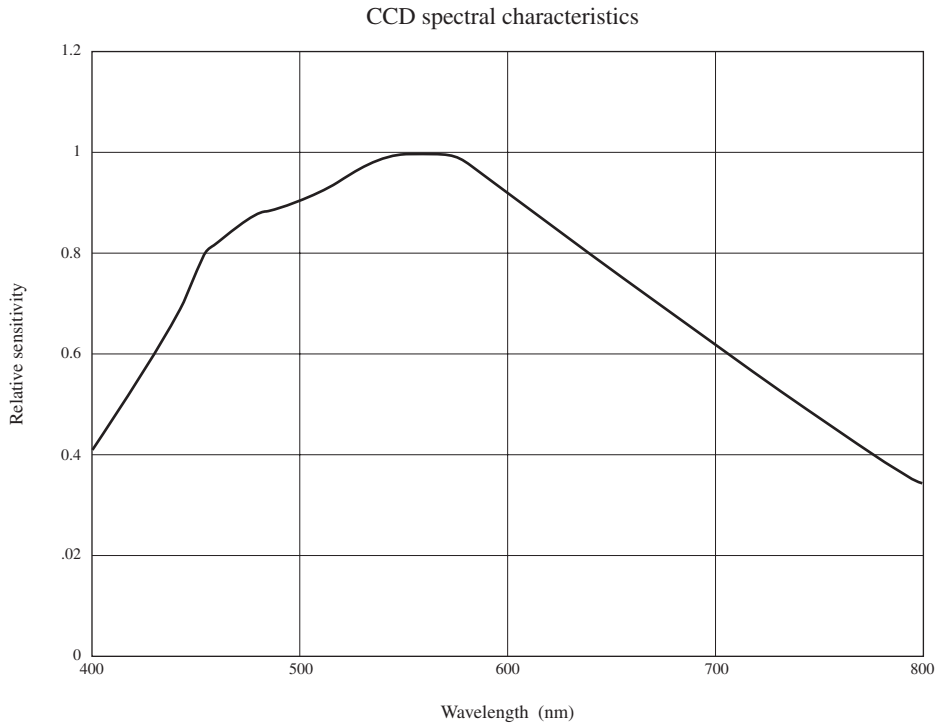
∗5: Ground LG pin with the capacitor of 0.047 µF or more.

Ground ϕ_R pin with the capacitor of 1 MΩ.

■ Optical Characteristics

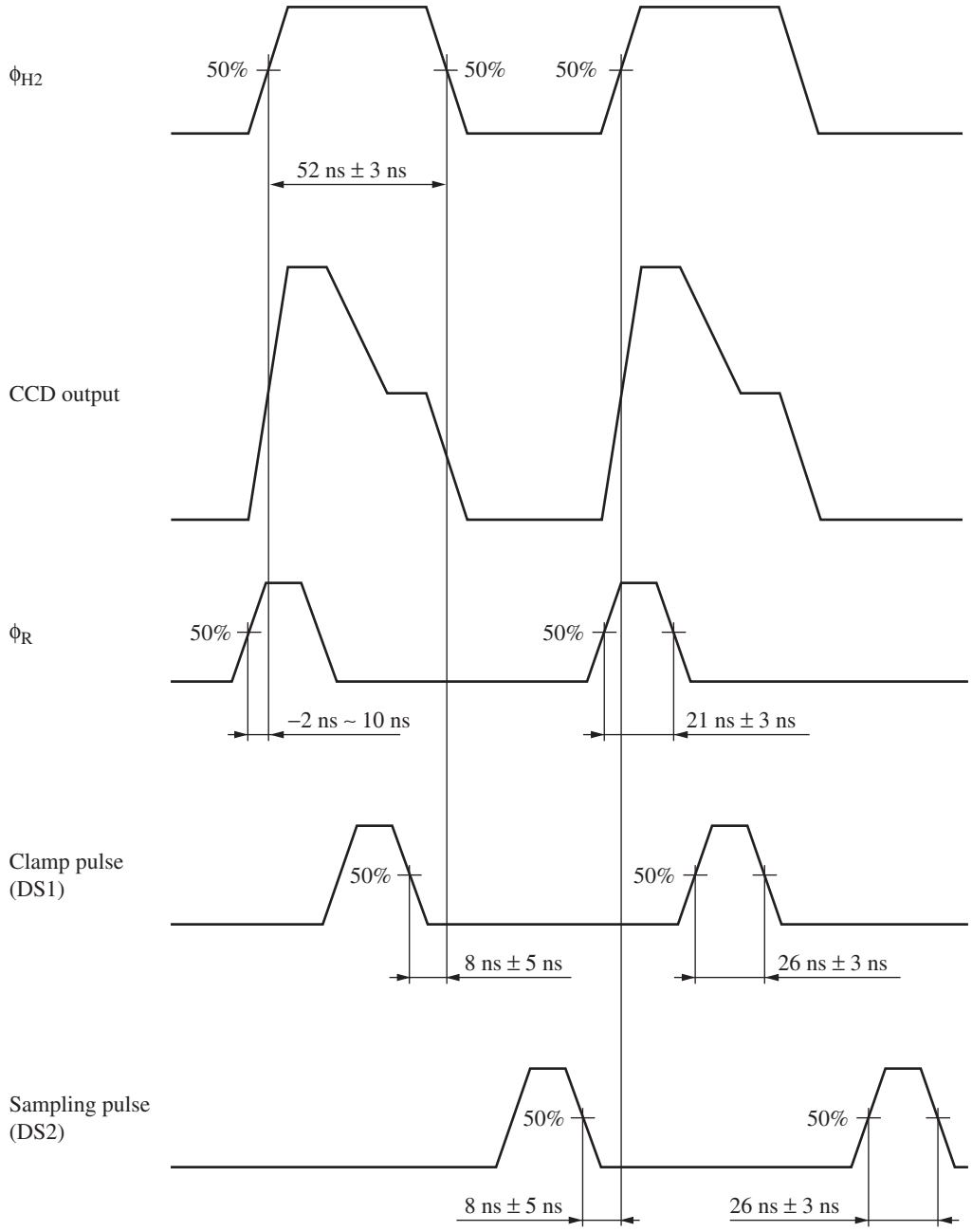
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
S/N ratio (dark)	S/Nd	Dark condition	58	60	—	dB
Sensitivity	So	J chart F8	480	650	—	mV
Saturation output	Sc	Saturation maximum output	700	900	—	mV
Vertical smear	Sm	1/10 V chart, F2.8	—	—	0.01	%

■ Graph of Characteristics



■ Timing Diagram

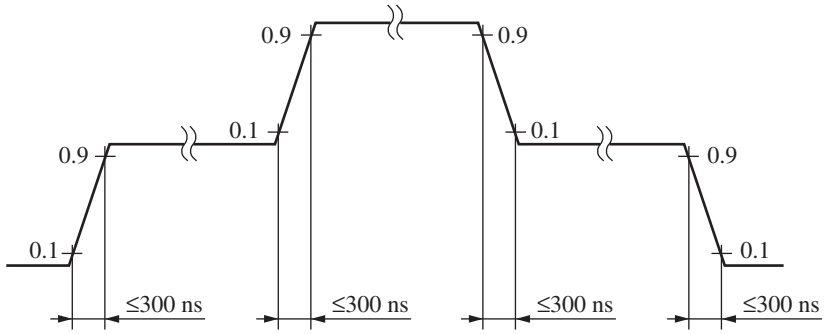
• High speed pulse timing



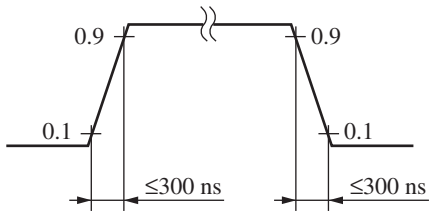
■ Timing Diagram (continued)

• Rise time and fall time of each pulse

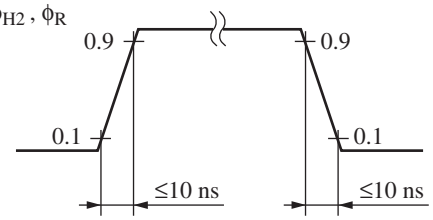
ϕ_{V1} , ϕ_{V3}



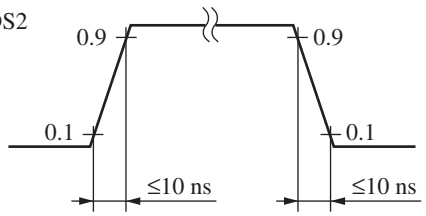
ϕ_{V2} , ϕ_{V4}



ϕ_{H1} , ϕ_{H2} , ϕ_{R}

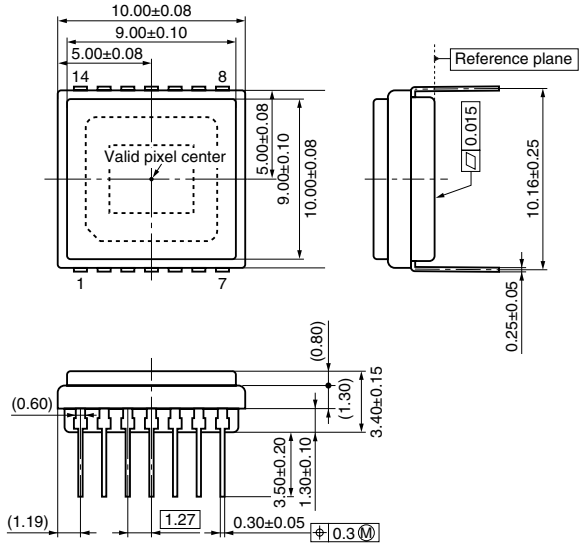


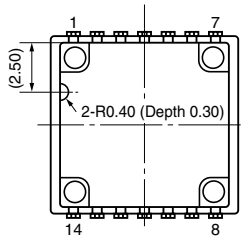
DS1, DS2



■ Package Dimensions (unit: mm)

• WDIP014-P-0400F





1. The center of the package is equal to the center of the effective pixel area.
2. The rotation angle of the effective pixel area: up to ±1.0 degree
3. The distance from the bottom face of the package to the surface of the effective pixel area: 1.69 mm ± 0.10 mm
4. The tilt of the effective pixel area for the bottom face of the package: up to 25 µm
5. Thickness of seal glass is 0.8 mm, and the refractive index is 1.50.
6. Package weight: 0.65 g (typ.)

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