MN39143AT

Diagonal 6.0 mm (type-1/3) 410k-pixel CCD Area Image Sensor

■ Overview

The MN39143AT is a 6.0 mm (type-1/3) 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 403 920 pixels (816 horizontal × 495 vertical) and provides stable and clear images with a resolution of 550 horizontal TV-lines and 350 vertical TV-lines.

Part Number	Size	System	Color or B/W
MN39143AT	6.0 mm (type-1/3)	EIA	B/W

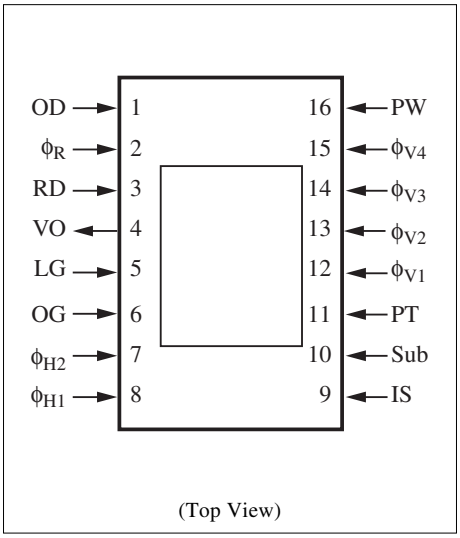
■ Features

- Effective pixel number 771 (horizontal) × 492 (vertical)
- High sensitivity
- Broad dynamic range
- Low smear
- Electronic shutter

■ Applications

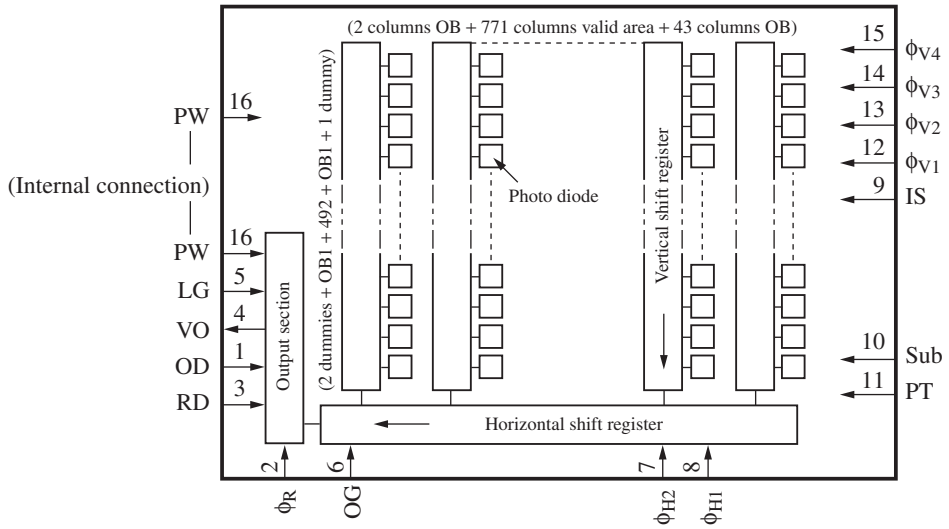
- Serveillance cameras
- FA, OA cameras

■ Pin Assignments



(Top View)

■ Block Diagram



■ Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	OD	Output drain	9	IS	Horizontal CCD input source
2	ϕ_R	Reset pulse	10	Sub	Substrate
3	RD	Reset drain	11	PT	P-well for protection circuit
4	VO	Video 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 register clock pulse 2	15	ϕ_{V4}	Vertical shift register clock pulse 4
8	ϕ_{H1}	Horizontal register clock pulse 1	16	PW	P-well

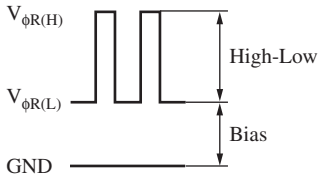
■ Device Parameter (H × V)

Parameter	Value	Unit
Total pixel number	816 × 495	pixel
Effective pixel number	771 × 492	pixel
Active pixel number	759 × 482	pixel
Image sensing block dimension	4.93 × 3.69	mm^2
Pixel dimension	6.40 × 7.50	μm^2

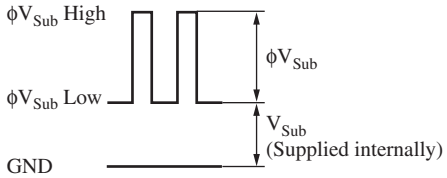
■ Absolute Maximum Ratings and Operating Conditions

Parameter		Absolute maximum rating		Operating condition			Unit
		Lower limit	Upper limit	Min	Typ	Max	
V_{RD}		– 0.2	18.0	14.5	15.0	15.5	V
V_{OD}		– 0.2	18.0	14.5	15.0	15.5	V
V_{IS}		– 0.2	18.0	14.5	15.0	15.5	V
V_{LG}		(Internal bias)					V
V_{OG}		(Internal bias)					V
V_{PT} *3, 4		–9.0	0.2	–7.3	–7.0	–6.7	V
V_{PW}		(Reference voltage)		—	0	—	V
$V_{\phi R}$ *1,	High-Low	– 0.2	5.0	3.0	3.3	3.6	V
	Bias	– 0.2	5.0	(Supplied internally)			V
$V_{\phi H1}$	High	– 0.2	5.0	3.0	3.3	3.6	V
	Low	– 0.2	5.0	– 0.1	0	0.1	V
$V_{\phi H2}$	High	– 0.2	5.0	3.0	3.3	3.6	V
	Low	– 0.2	5.0	– 0.1	0	0.1	V
V_{Sub} *2		– 0.2	45.0	(Supplied internally)			V
ϕV_{Sub} *2		– 0.2	45.0	21.0	22.0	23.0	V
$V_{\phi V1}$ *3, 4	High	–9.0	18.0	14.5	15.0	15.5	V
	Middle	–9.0	18.0	– 0.2	0	0.2	V
	Low	–9.0	18.0	–7.3	–7.0	–6.7	V
$V_{\phi V2}$ *3, 4	Middle	–9.0	15.0	– 0.2	0	0.2	V
	Low	–9.0	15.0	–7.3	–7.0	–6.7	V
$V_{\phi V3}$ *3, 4	High	–9.0	18.0	14.5	15.0	15.5	V
	Middle	–9.0	18.0	– 0.2	0	0.2	V
	Low	–9.0	18.0	–7.3	–7.0	–6.7	V
$V_{\phi V4}$ *3, 4	Middle	–9.0	15.0	– 0.2	0	0.2	V
	Low	–9.0	15.0	–7.3	–7.0	–6.7	V
Operating temperature		–10	70	—	25	—	°C
Storage temperature		–30	80	—	—	—	°C

Note) ∗1 : Reset



∗2: V_{Sub} when using electronic shutter function



∗3: Absolute maximum rating $-0.2 < V_{\phi V} - V_{PT} < 24.5$ (V)

∗4: Relation between V_{PT} and $V_{\phi VL}$

Set V_{PT} that is to meet the following conditions for VL voltage of the vertical shift clock waveform.

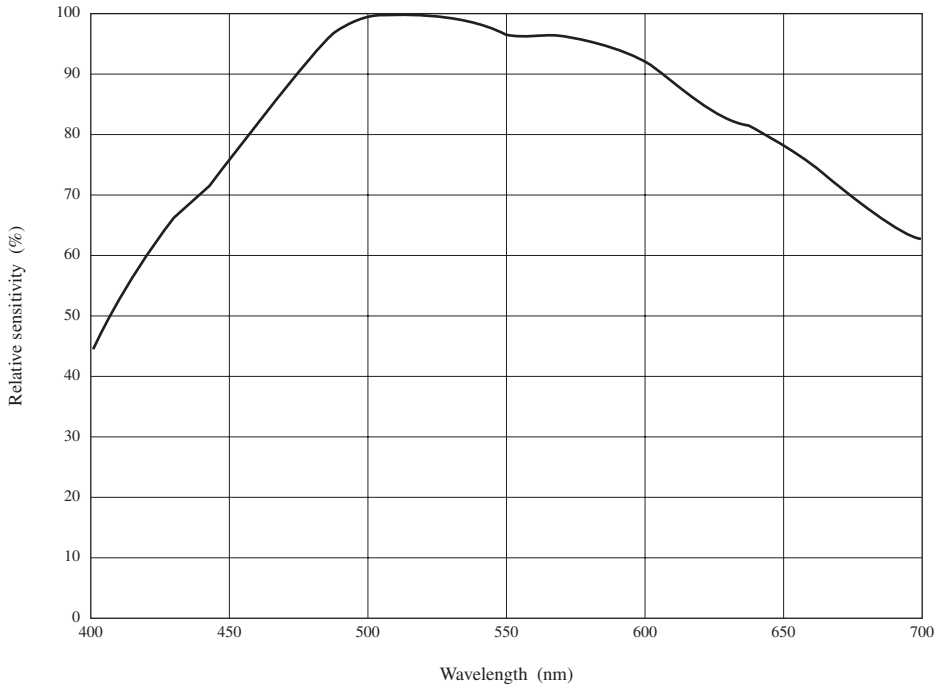
$V_{PT} \leq VL$ ($V_{\phi V1L}$ to $V_{\phi V4L}$)

■ Optical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
S/N ratio (dark)	S/Nd	Dark condition	57	60	—	dB
Sensitivity	So	Standard condition (J chart)		750	—	mV
Carrier saturation output	Sa	J chart		1 400	—	mV
Vertical smear	Sm	1/10 V chart, F2.8	—	−100	−95	dB

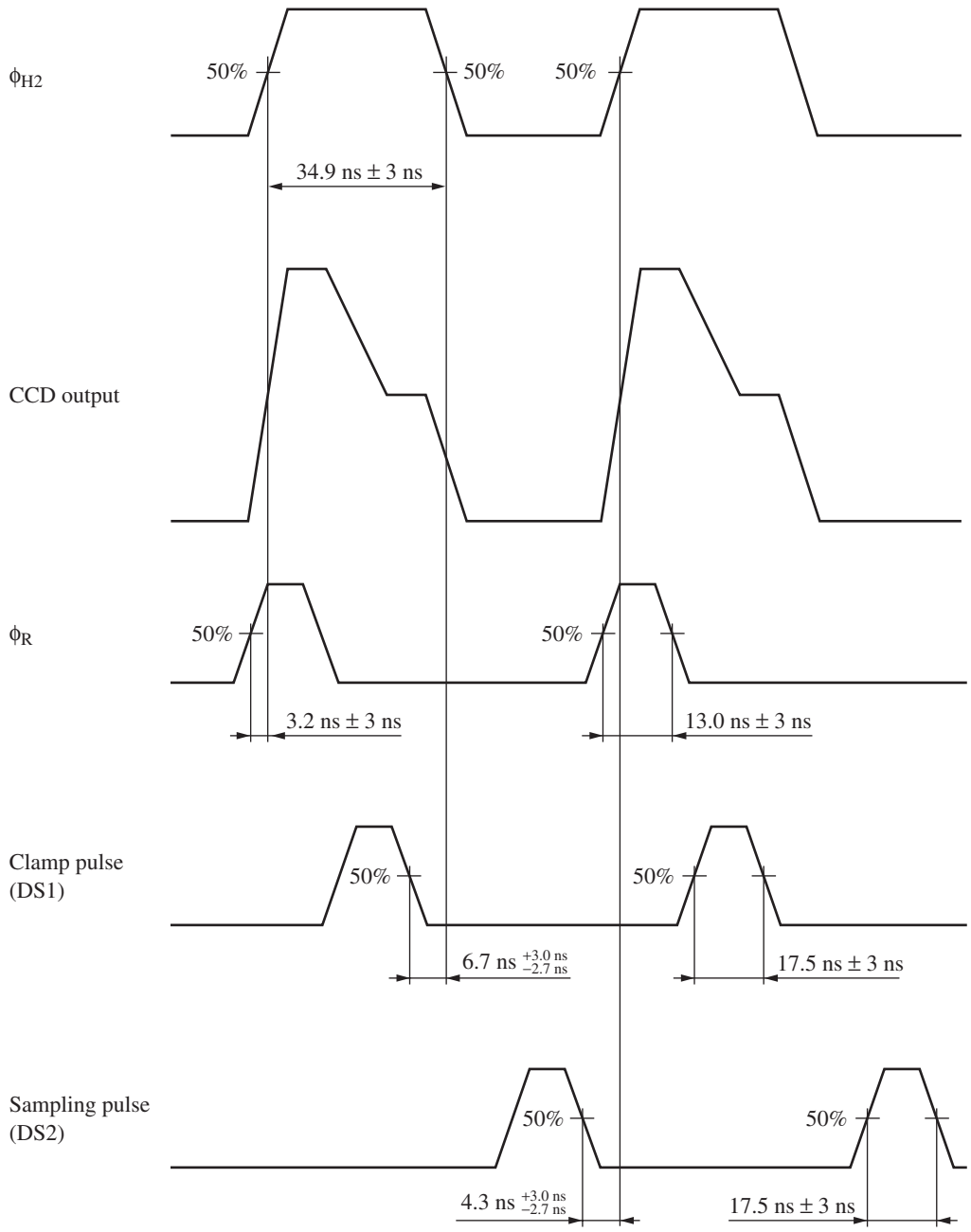
■ Graph of Characteristics

CCD spectral characteristics



■ Timing Diagram

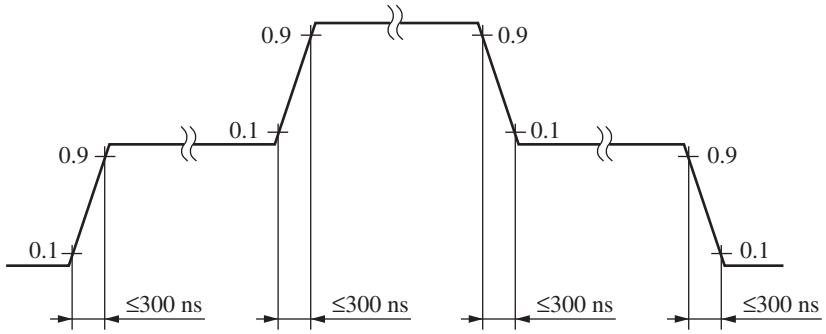
• High speed pulse timing



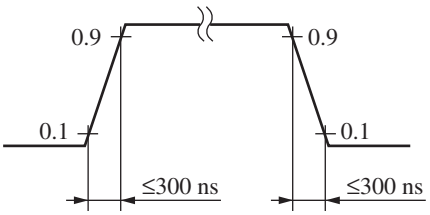
■ Timing Diagram (continued)

• Rise time and fall time of each pulse

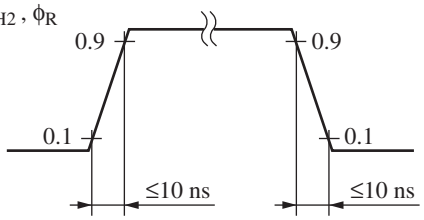
ϕ_{V1} , ϕ_{V3}



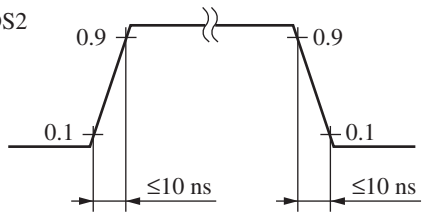
ϕ_{V2} , ϕ_{V4}



ϕ_{H1} , ϕ_{H2} , ϕ_{R}

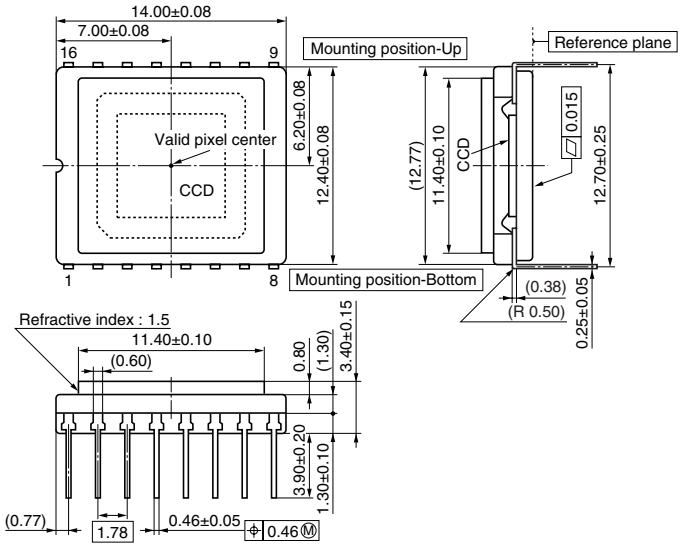


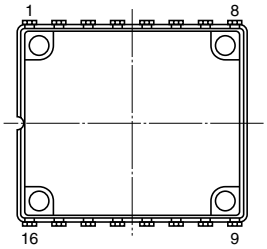
DS1, DS2



■ Package Dimensions (unit: mm)

• WDIP016-P-0500C





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 seal glass surface to the surface of the effective pixel area: 1.69 mm ± 0.10 mm
4. The tilt of the effective pixel area for the seal glass surface: up to 30 µm
5. Thickness of the seal glass: 0.8 mm ± 0.10 mm, and the refractive index: 1.50

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