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

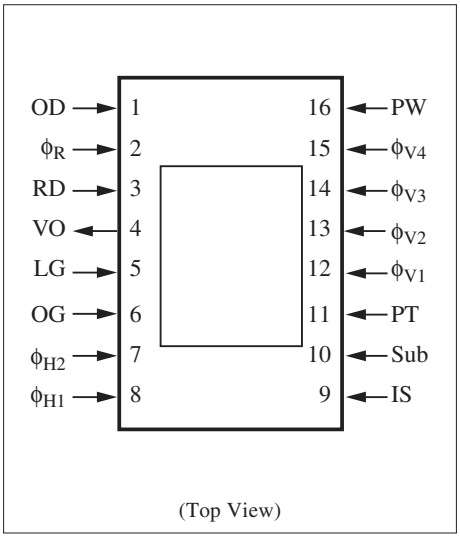
■ Features

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

■ Applications

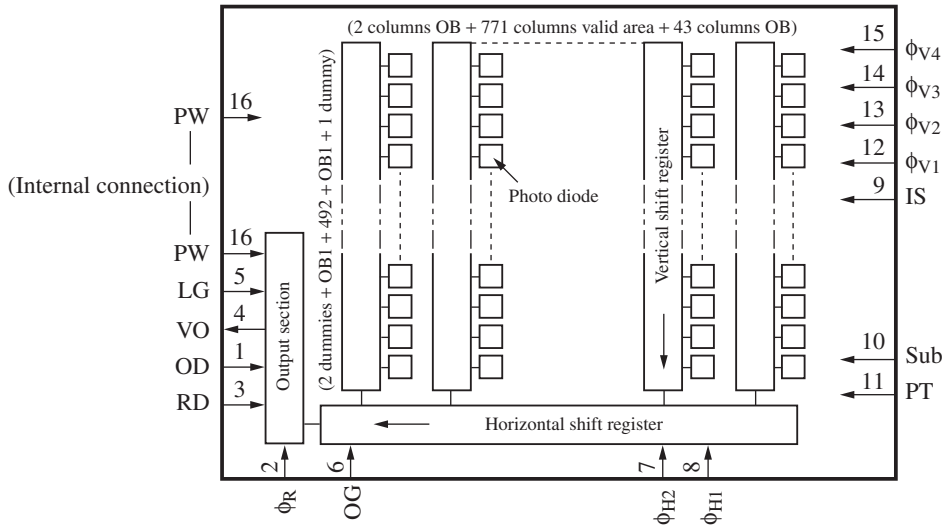
- Serveillance cameras
- FA, OA cameras

■ 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

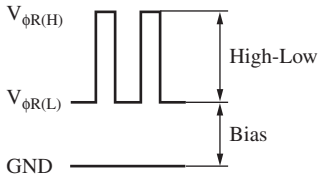
■ Device Parameter (H × V)

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

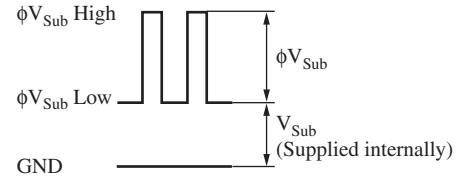
■ Absolute Maximum Ratings and Operating Conditions

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 $V_{\phi VL}$

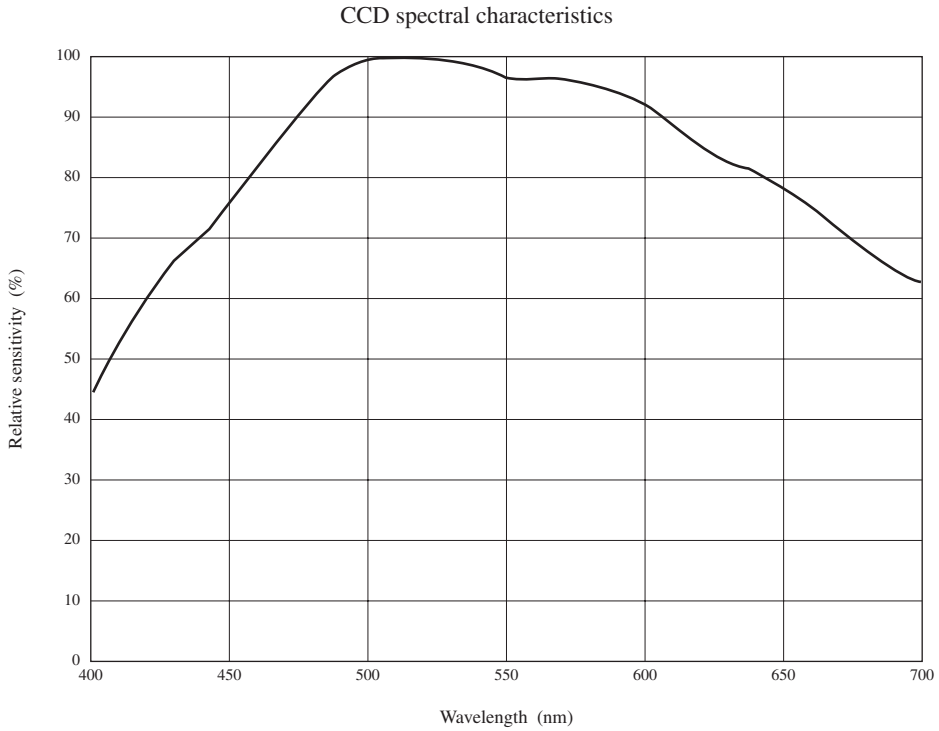
Set V_{PT} that is to meet the following conditions for VL voltage of the vertical shift clock waveform.

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

■ Optical Characteristics

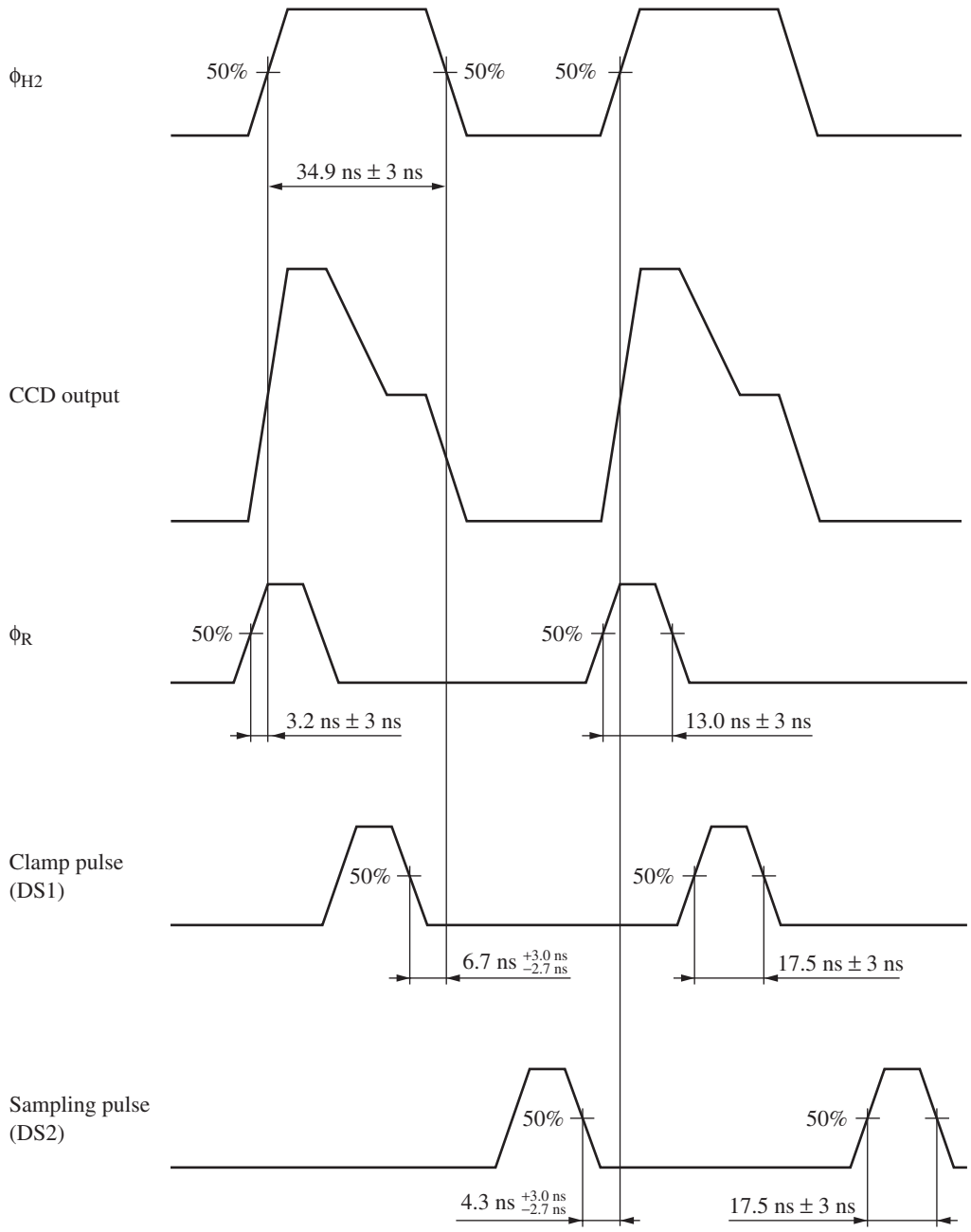
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
S/N ratio (dark)	S/Nd	Dark condition	57	60	—	dB
Sensitivity	So	Standard condition (J chart)		750	—	mV
Carrier saturation output	Sa	J chart		1 400	—	mV
Vertical smear	Sm	1/10 V chart, F2.8	—	–100	–95	dB

■ Graph of Characteristics



■ Timing Diagram

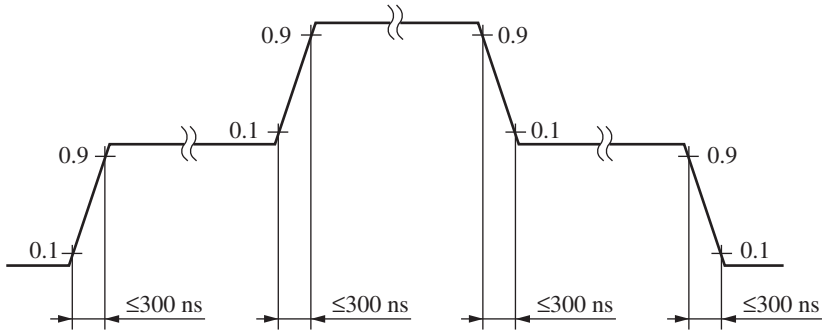
• High speed pulse timing



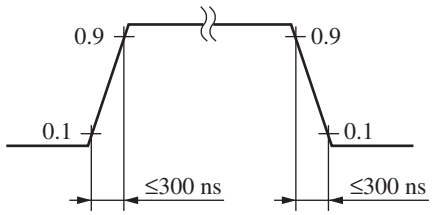
■ Timing Diagram (continued)

• Rise time and fall time of each pulse

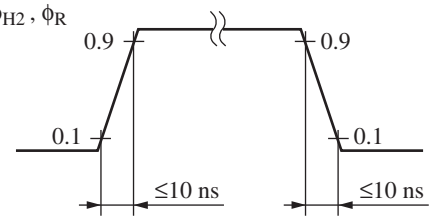
ϕ_{V1} , ϕ_{V3}



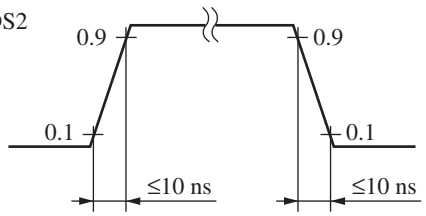
ϕ_{V2} , ϕ_{V4}



ϕ_{H1} , ϕ_{H2} , ϕ_{R}

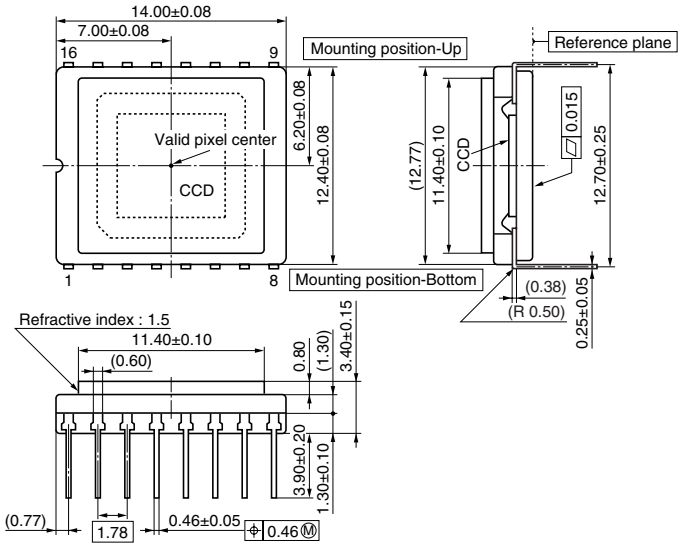


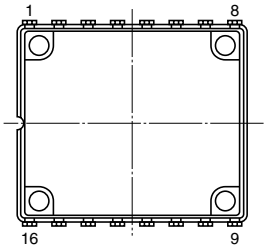
DS1, DS2



■ 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 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 30 µm
5. Thickness of seal glass is 0.8 mm ± 0.10 mm, and the refractive index is 1.50.

Request for your special attention and precautions in using the technical information and semiconductors described in this material

(1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.

(2) The technical information described in this material is limited to showing representative characteristics and applied circuits examples of the products. It neither warrants non-infringement of intellectual property right or any other rights owned by our company or a third party, nor grants any license.

(3) We are not liable for the infringement of rights owned by a third party arising out of the use of the product or technologies as described in this material.

(4) The products described in this material are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
- Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
- Any applications other than the standard applications intended.

(5) The products and product specifications described in this material are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.

(6) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage, and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.

(7) When using products for which damp-proof packing is required, observe the conditions (including shelf life and amount of time let standing of unsealed items) agreed upon when specification sheets are individually exchanged.