

# MN39143FT

## 6 mm (type-1/3) High-sensitivity CCD Area Image Sensor

### ■ Overview

The MN39143FT is a 6 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 1/10 000 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 480 horizontal TV-lines and 350 vertical TV-lines.

Part Number	Size	System	Color or B/W
MN39143FT	6mm (type-1/3)	NTSC	Color

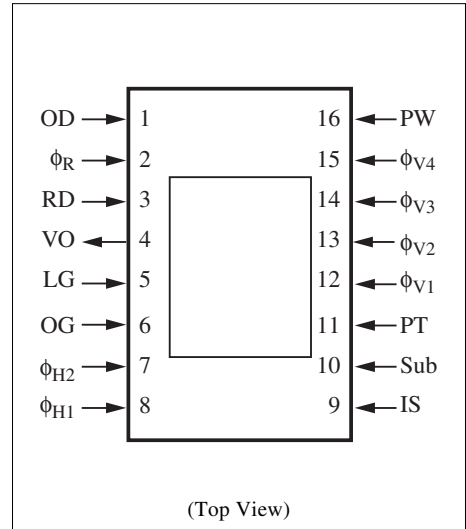
### ■ Features

- Total number of pixels: 816 (horizontal) × 495 (vertical)
- High sensitivity
- Broad dynamic range  
(compared to our conventional CCD ×1.2)
- Low smear
- Electronic shutter
- No image distortion
- Small size enables design of compact equipment
- High reliability

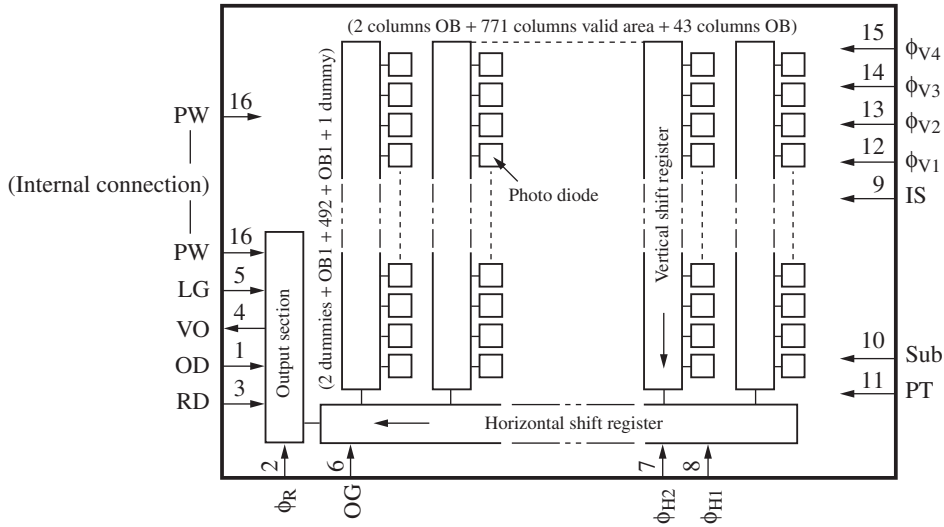
### ■ Applications

- Camcorders, surveillance cameras, door cameras

### ■ Pin Assignments



■ Block Diagram



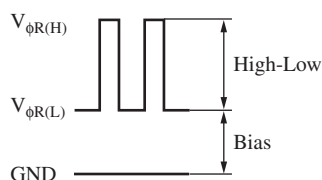
■ Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	OD	Output drain	9	IS	Horizontal CCD input source
2	$\phi_R$	Reset pulse	10	Sub	Substrate
3	RD	Reset drain	11	PT	P-well for protection circuit
4	VO	Video output	12	$\phi_{V1}$	Vertical shift register clock pulse 1
5	LG	Output load transistor gate	13	$\phi_{V2}$	Vertical shift register clock pulse 2
6	OG	Output gate	14	$\phi_{V3}$	Vertical shift register clock pulse 3
7	$\phi_{H2}$	Horizontal register clock pulse 2	15	$\phi_{V4}$	Vertical shift register clock pulse 4
8	$\phi_{H1}$	Horizontal register clock pulse 1	16	PW	P-well

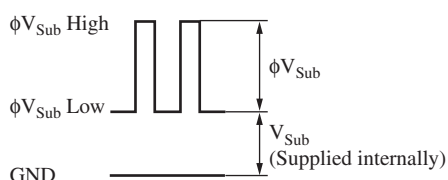
## ■ Absolute Maximum Ratings and Operating Conditions

Parameter	Symbol	Rating		Operating condition			Unit	
		Min	Max	Min	Typ	Max		
Reset drain voltage	$V_{RD}$	-0.2	18.0	14.5	15.0	15.5	V	
Output drain voltage	$V_{OD}$	-0.2	18.0	14.5	15.0	15.5	V	
Output load transistor gate voltage	$V_{LG}$	(Internal bias)					V	
Output gate voltage	$V_{OG}$	(Internal bias)					V	
Horizontal CCD input source voltage	$V_{IS}$	-0.2	18.0	14.5	15.0	15.5	V	
Protection P-well voltage	$V_{PT}^{*3,4}$	-9.0	0.2	-7.3	-7.0	-6.7	V	
P-well voltage	$V_{PW}$	Reference voltage		—	0	—	V	
Reset pulse voltage	High-Low	$V_{\phi R(H-L)}^{*1}$	—	5.0	3.0	3.3	3.6	V
	Bias	$V_{\phi R(Bias)}^{*1}$	-0.2	—	Supplied internally			V
Horizontal register clock pulse voltage 1	$V_{\phi H1(H)}$	—	5.0	3.0	3.3	3.6	V	
	$V_{\phi H1(L)}$	-0.2	—	-0.1	0	0.1		
Horizontal register clock pulse voltage 2	$V_{\phi H2(H)}$	—	5.0	3.0	3.3	3.6	V	
	$V_{\phi H2(L)}$	-0.2	—	-0.1	0	0.1		
Vertical shift register clock pulse voltage 1	$V_{\phi V1(H)}^{*3,4}$	—	18.0	14.5	15.0	15.5	V	
	$V_{\phi V1(M)}^{*3,4}$	—	—	-0.2	0	0.2		
	$V_{\phi V1(L)}^{*3,4}$	-9.0	—	-7.3	-7.0	-6.7		
Vertical shift register clock pulse voltage 2	$V_{\phi V2(M)}^{*3,4}$	—	15.0	-0.2	0	0.2	V	
	$V_{\phi V2(L)}^{*3,4}$	-9.0	—	-7.3	-7.0	-6.7		
Vertical shift register clock pulse voltage 3	$V_{\phi V3(H)}^{*3,4}$	—	18.0	14.5	15.0	15.5	V	
	$V_{\phi V3(M)}^{*3,4}$	—	—	-0.2	0	0.2		
	$V_{\phi V3(L)}^{*3,4}$	-9.0	—	-7.3	-7.0	-6.7		
Vertical shift register clock pulse voltage 4	$V_{\phi V4(M)}^{*3,4}$	—	15.0	-0.2	0	0.2	V	
	$V_{\phi V4(L)}^{*3,4}$	-9.0	—	-7.3	-7.0	-6.7		
Substrate voltage	$V_{Sub}^{*2}$	-0.2	45.0	Supplied internally			V	
	$\phi V_{Sub}^{*2}$			21.0	22.0	23.0		
Operating temperature	$T_{opr}$	-10	70	—	25	—	°C	
Storage temperature	$T_{stg}$	-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  $V_{\phi V(L)}$

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

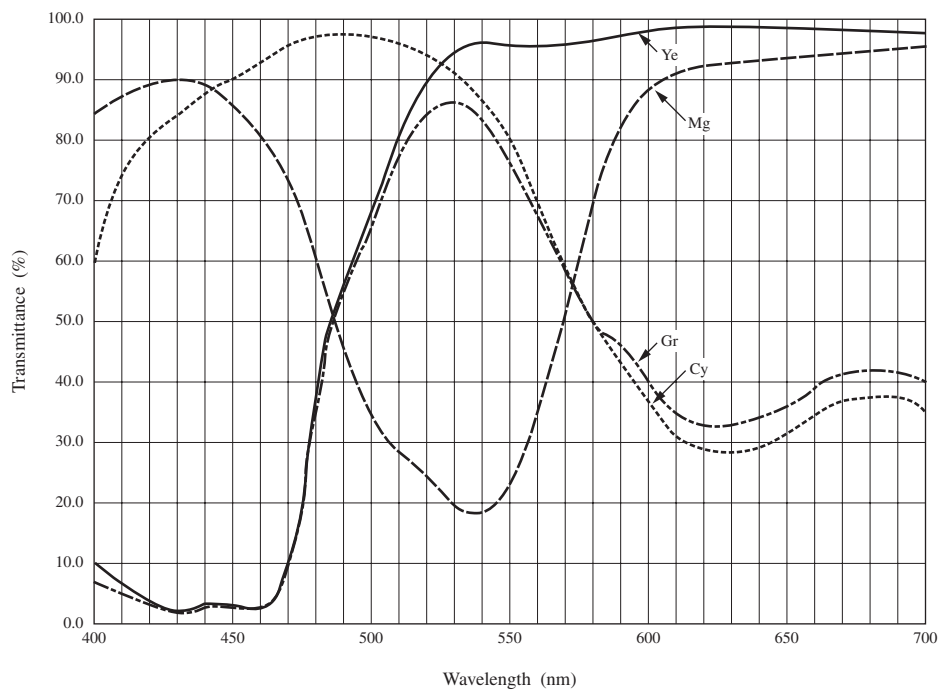
$$V_{PT} \leq VL (V_{\phi V1L} \text{ to } V_{\phi V4L})$$

■ Optical Characteristics

Part Number	Color or B/W	Effective pixels		Saturation output Typ (mV)	Sensitivity F8 Typ (mV)	Vertical smear Sm Typ (dB)	Horizontal resolution Typ (TV-lines)	Vertical resolution Typ (TV-lines)
		H	V					
MN39143FT	Color	771	492	800	450	-100	480	350

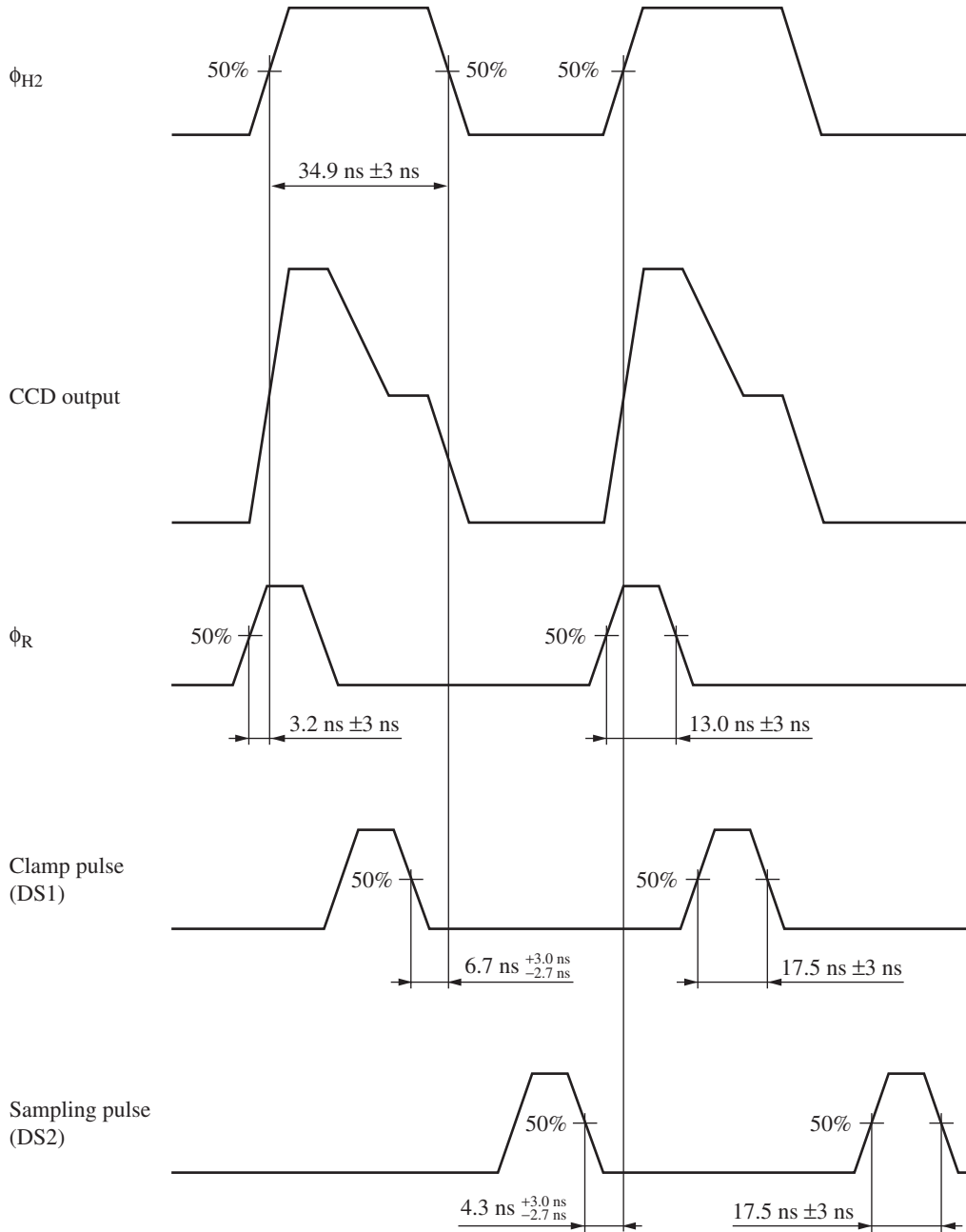
■ Graph of Characteristics

CCD color filter spectral characteristics



■ Timing Diagram

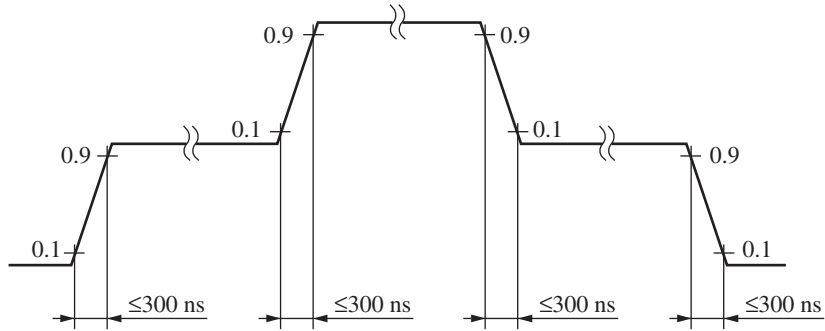
- High speed pulse timing



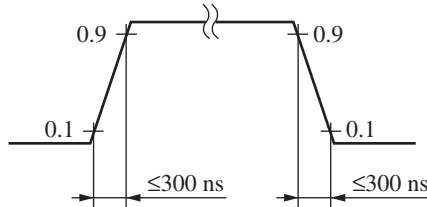
■ Timing Diagram (continued)

- Rise time and fall time of each pulse

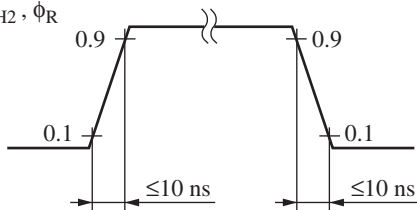
$\phi_{V1}, \phi_{V3}$



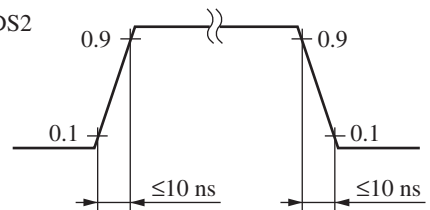
$\phi_{V2}, \phi_{V4}$



$\phi_{H1}, \phi_{H2}, \phi_R$

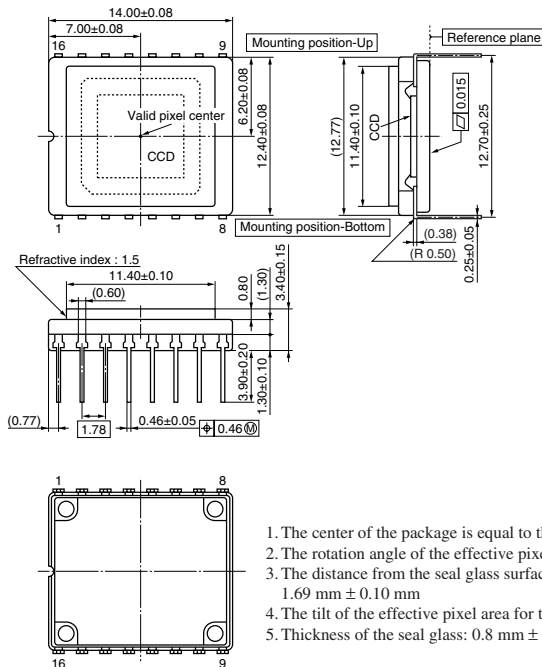


DS1, DS2



■ 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  $\pm 1.0$  degree
3. The distance from the seal glass surface to the surface of the effective pixel area:  $1.69\text{ mm} \pm 0.10\text{ mm}$
4. The tilt of the effective pixel area for the seal glass surface: up to  $30\text{ }\mu\text{m}$
5. Thickness of the seal glass:  $0.8\text{ mm} \pm 0.10\text{ mm}$ , and the refractive index: 1.50

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