

# MN39242FT

## Diagonal 4.5 mm (type-1/4) 570k-pixel CCD Area Image Sensor

### ■ Overview

The MN39242FT 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 1/10 000 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 566 040 pixels (795 horizontal  $\times$  712 vertical) and provides stable and clear images with a resolution of 480 horizontal TV-lines and 420 vertical TV-lines.

Part Number	Size	System	Color or B/W
MN39242FT	4.5 mm (type-1/4)	PAL	Color

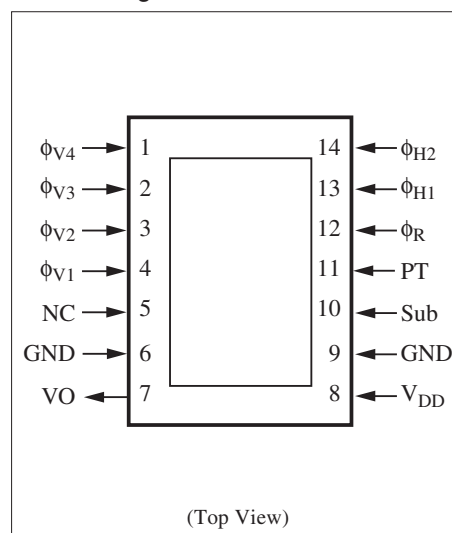
### ■ Features

- Effective pixel number: 752 (horizontal)  $\times$  697 (vertical)
- High sensitivity
- Broad dynamic range
- Low smear
- Electronic shutter

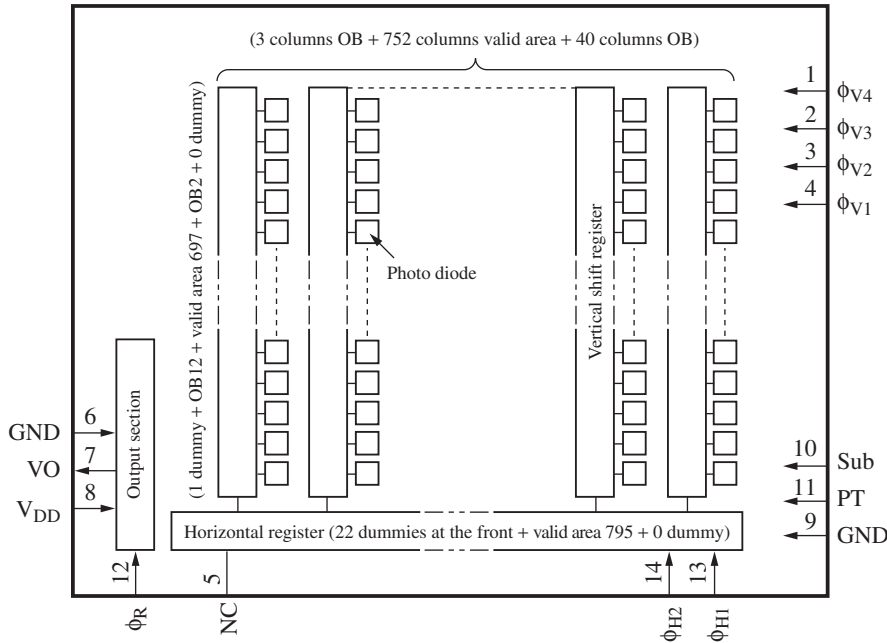
### ■ Applications

- Camcorders

### ■ Pin Assignments



■ Block Diagram



■ Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	$\phi_{V4}$	Vertical shift register clock pulse 4	8	$V_{DD}$	Power supply
2	$\phi_{V3}$	Vertical shift register clock pulse 3	9	GND	GND
3	$\phi_{V2}$	Vertical shift register clock pulse 2	10	Sub	Substrate
4	$\phi_{V1}$	Vertical shift register clock pulse 1	11	PT	P-well for protection circuit
5	NC	NC	12	$\phi_R$	Reset pulse
6	GND	GND	13	$\phi_{H1}$	Horizontal register clock pulse 1
7	VO	Video output	14	$\phi_{H2}$	Horizontal register clock pulse 2

■ Device Parameter (H × V)

Parameter	Value	Unit
Total pixel number	795 × 712	pixel
Active pixel number	737 × 690	pixel
Pixel dimension	4.85 × 3.9	$\mu\text{m}^2$
Image sensing block dimension	3.65 × 2.72	mm <sup>2</sup>

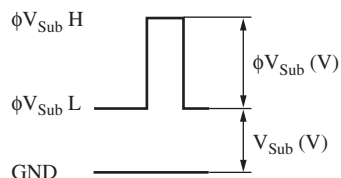
## Absolute Maximum Ratings and Operating Conditions

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
$V_{PT}^{*3, 4}$		-10.0	0.2	-7.5	-7.0	-6.5	V
GND		(Reference voltage)		—	0	—	V
$V_{\phi R}$	High-Low	—	8.0	3.0	3.3	3.6	V
	Bias	(Supplied internally)					V
$V_{\phi H1}$	High	—	8.0	3.0	3.3	3.6	V
	Low	- 0.2	—	- 0.05	0	0.05	V
$V_{\phi H2}$	High	—	8.0	3.0	3.3	3.6	V
	Low	- 0.2	—	- 0.05	0	0.05	V
$V_{Sub}^{*2}$		(Supplied internally)					V
$\phi V_{Sub}^{*1}$		- 0.2	45.0	21.2	22.0	22.8	V
$V_{\phi V1}^{*3, 4}$	High	—	18.0	14.5	15.0	15.5	V
	Middle	—	—	- 0.05	0	0.05	V
	Low	-9.0	—	-7.3	-7.0	-6.7	V
$V_{\phi V2}^{*3, 4}$	Middle	—	15.0	- 0.05	0	0.05	V
	Low	-9.0	—	-7.3	-7.0	-6.7	V
$V_{\phi V3}^{*3, 4}$	High	—	18.0	14.5	15.0	15.5	V
	Middle	—	—	- 0.05	0	0.05	V
	Low	-9	—	-7.3	-7.0	-6.7	V
$V_{\phi V4}^{*3, 4}$	Middle	—	15.0	- 0.05	0	0.05	V
	Low	-9.0	—	-7.3	-7.0	-6.7	V
Operating temperature		-10	70	—	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 2856K, luminance of 1050 cd/m<sup>2</sup>, 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



\*2:  $V_{Sub}$  supplied internally is the voltage suppressing the blooming generation at  $\times 1\,000$  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.

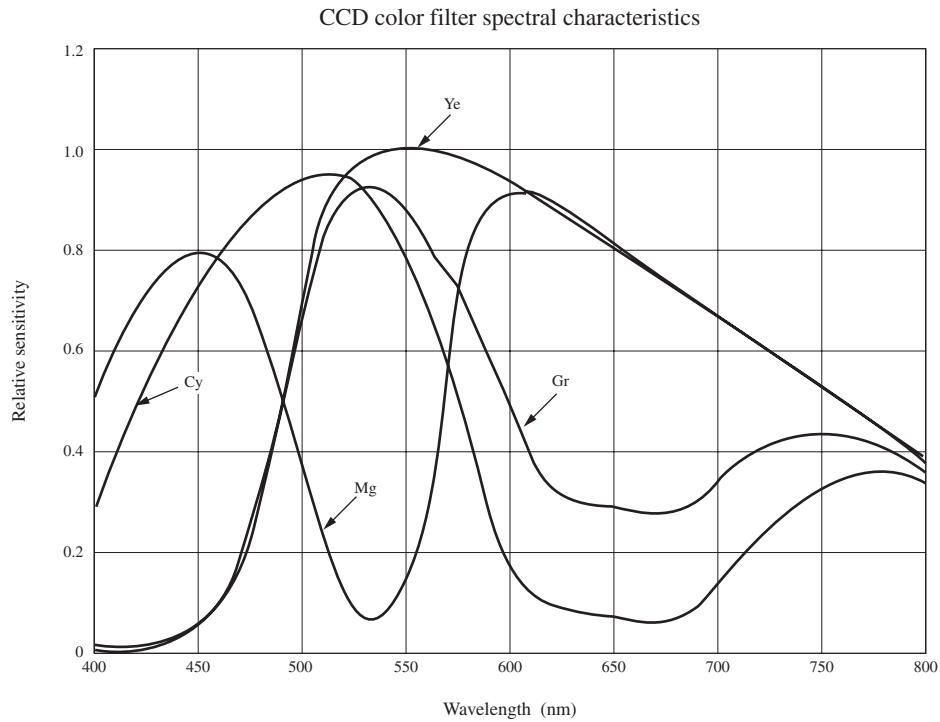
$$V_{PT} \leq VL \text{ (} V_{\phi V1L} \text{ to } V_{\phi V4L} \text{)}$$

\*4: Absolute maximum ratings  $-0.2 < V_{\phi V} - V_{PT} < 24.5 \text{ (V)}$

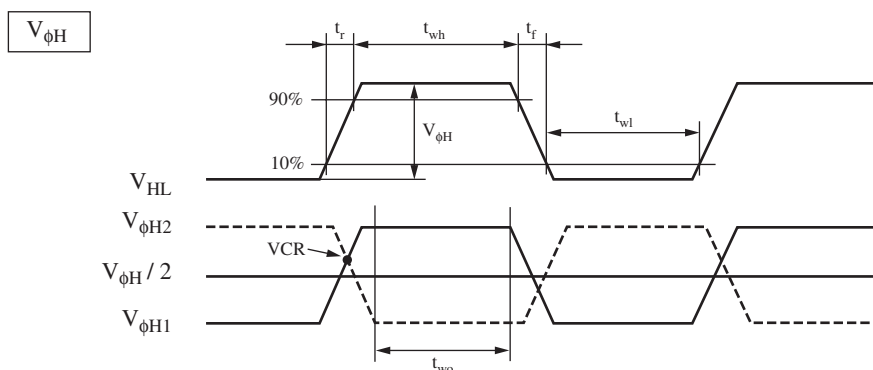
■ Optical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
S/N ratio (dark)	S/Nd	Dark condition	59	61	—	dB
Sensitivity	So	J chart F8	160	190	—	mV
Carrier saturation output	Sa	Carrier maximum output	400	500	—	mV
Vertical smear	Sm	1/10 V chart, F2.8	—	0.008	0.01	%

■ Graph of Characteristics

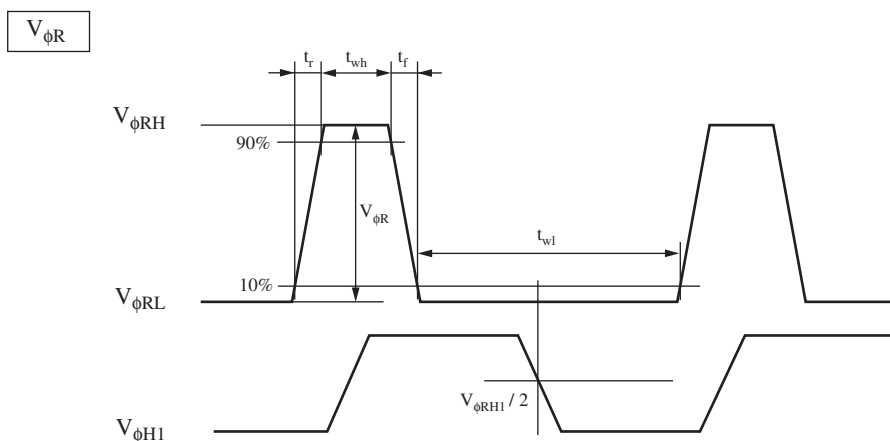


## ■ CCD Drive Timing Charts



The overlap period of  $t_{wh}$  of horizontal transfer pulse  $V_{\phi H1}$  and  $t_{wl}$  of  $V_{\phi H2}$  and the overlap period of  $t_{wl}$  of horizontal transfer pulse  $V_{\phi H1}$  and  $t_{wh}$  of  $V_{\phi H2}$  are defined as  $t_{wo}$ .

And VCR is the cross point voltage of the rising  $V_{\phi H1}$  and the falling  $V_{\phi H2}$ .



$V_{\phi RL}$  is the mean value of the waveform from the cross point of the mesial magnitude of above  $\phi_{H1}$  and  $\phi_{Rtwl}$  period to the rising point.

And  $V_{\phi RH}$  is the minimum value in  $t_{wh}$  period, and  $V_{\phi R}$  is defined as  $V_{\phi R} = V_{\phi RH} - V_{\phi RL}$ .

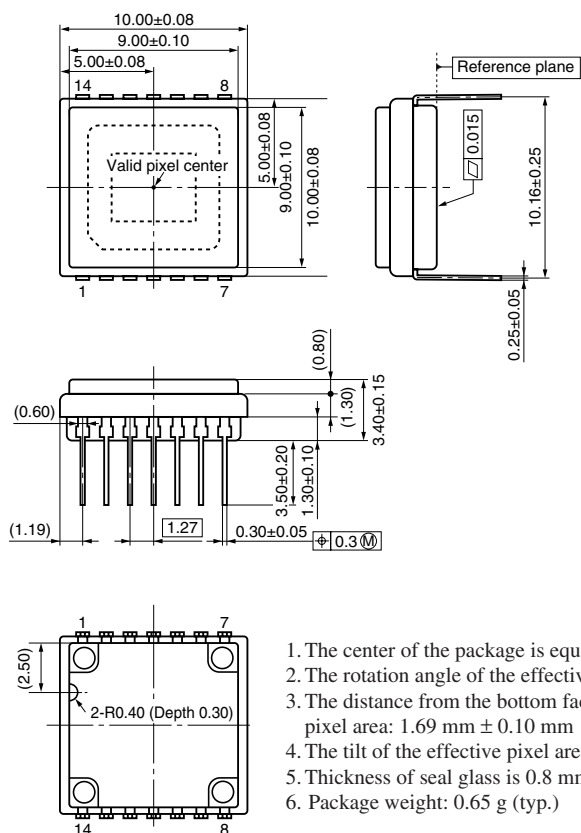
Parameter	Symbol	$t_{wh}$			$t_{wl}$			$t_r$			$t_f$			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Reset pulse	$V_{\phi R}$	9.0	10.0		46.5	47.5			3.0	4.0		3.0	4.0	ns
Horizontal transfer pulse	$V_{\phi H1}$	23.75	25.75		23.75	25.75			6.0	8.0		6.0	8.0	ns
	$V_{\phi H2}$	23.75	25.75		23.75	25.75			6.0	8.0		6.0	8.0	ns

VCR is  $V_{\phi H} / 2$  volts or more.

Parameter	Symbol	$t_{wo}$			Unit
		Min	Typ	Max	
Horizontal transfer pulse	$V_{\phi H1}, V_{\phi H2}$	20.75	25.75	—	ns

# ■ Package Dimensions (unit: mm)

## • WDIP014P-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  $\pm 1.0$  degree
3. The distance from the bottom face of the package 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 bottom face of the package: up to  $25 \text{ } \mu\text{m}$
5. Thickness of seal glass is  $0.8 \text{ mm}$ , and the refractive index is  $1.50$ .
6. Package weight:  $0.65 \text{ g}$  (typ.)

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