

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

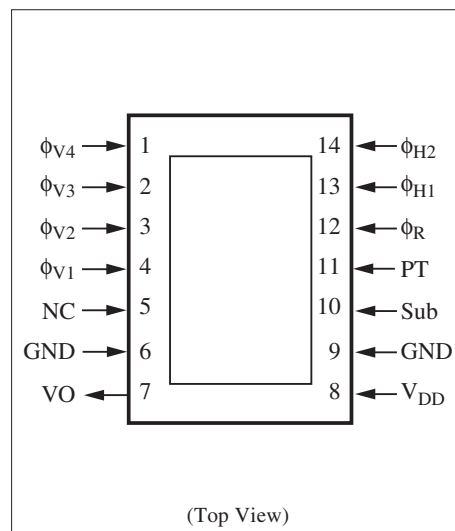
■ Features

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

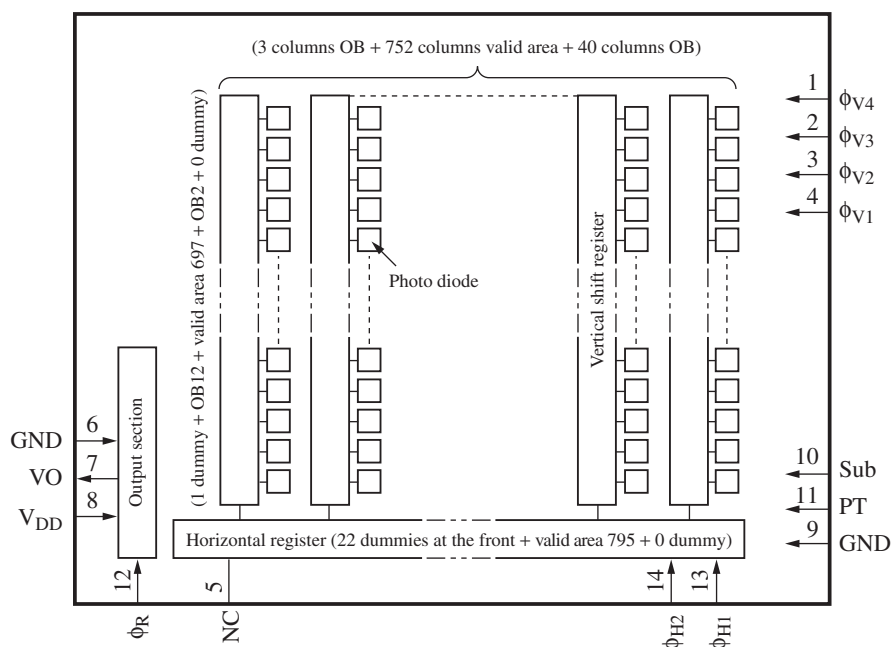
■ Applications

- Camcorders

■ Pin Assignments



■ Block Diagram



■ Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	ϕ_{V4}	Vertical shift register clock pulse 4	8	V_{DD}	Power supply
2	ϕ_{V3}	Vertical shift register clock pulse 3	9	GND	GND
3	ϕ_{V2}	Vertical shift register clock pulse 2	10	Sub	Substrate
4	ϕ_{V1}	Vertical shift register clock pulse 1	11	PT	P-well for protection circuit
5	NC	NC	12	ϕ_R	Reset pulse
6	GND	GND	13	ϕ_{H1}	Horizontal register clock pulse 1
7	VO	Video output	14	ϕ_{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	μm^2
Image sensing block dimension	3.65×2.72	mm^2

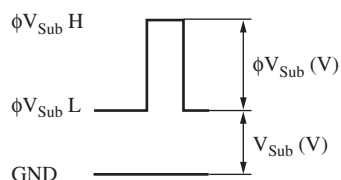
■ Absolute Maximum Ratings and Operating Conditions

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
ϕV_{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/m², 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.

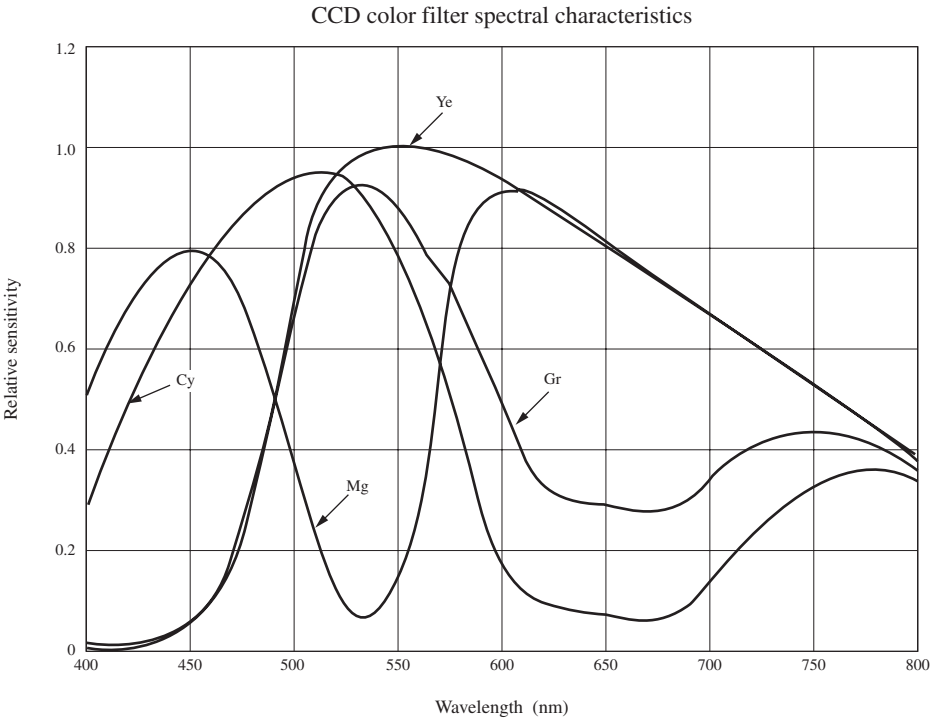
$$V_{PT} \leq VL \text{ (} V_{\phi VIL} \text{ to } V_{\phi V4L} \text{)}$$

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

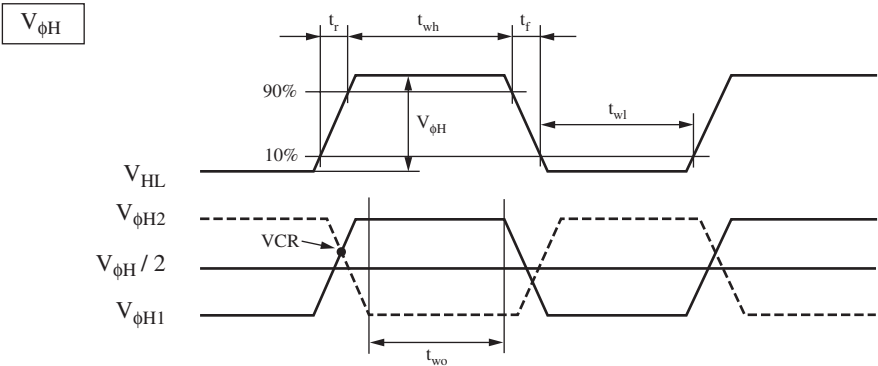
■ Optical Characteristics

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	%

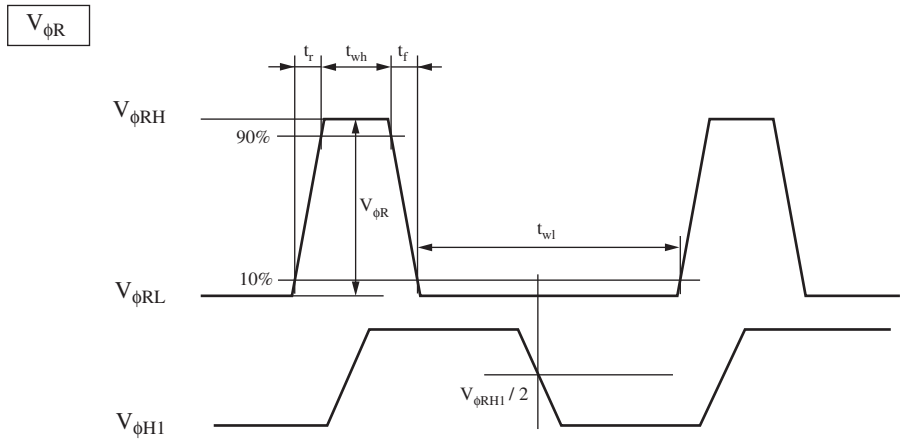
■ Graph of Characteristics



■ 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 ϕ_{H1} and ϕ_{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 $V_{\phi R} = V_{\phi RH} - V_{\phi RL}$.

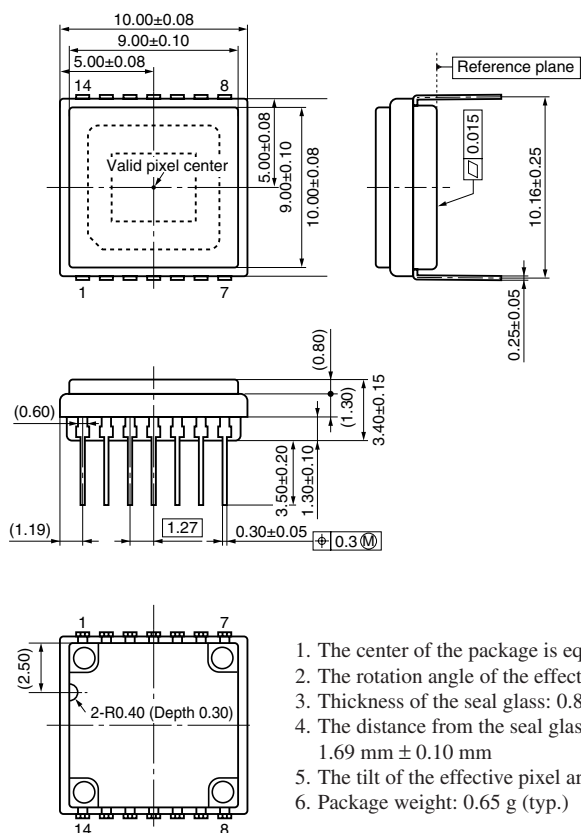
Parameter	Symbol	t_{wh}			t_{wl}			t_r			t_f			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Reset pulse	$V_{\phi R}$	9.0	10.0		46.5	47.5			3.0	4.0		3.0	4.0	ns
Horizontal transfer pulse	$V_{\phi H1}$	23.75	25.75		23.75	25.75			6.0	8.0		6.0	8.0	ns
	$V_{\phi H2}$	23.75	25.75		23.75	25.75			6.0	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 ± 1.0 degree
3. Thickness of the seal glass: 0.8 mm, and the refractive index: 1.50
4. The distance from the seal glass surface to the surface of the effective pixel area: $1.69 \text{ mm} \pm 0.10 \text{ mm}$
5. The tilt of the effective pixel area for the seal glass surface: up to $25 \text{ } \mu\text{m}$
6. Package weight: 0.65 g (typ.)

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