

# MN372132FT

## 4.5mm (type-1/4) CCD Area Image Sensor

### Overview

The MN372132FT is a 4.5mm (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 read out. 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 320,589 pixels (537 horizontal  $\times$  597 vertical) and provides stable and clear images with a resolution of 330 horizontal TV-lines and 420 vertical TV-lines.

| Part Number | Size            | System | Color or B/W |
|-------------|-----------------|--------|--------------|
| MN372132FT  | 4.5mm(type-1/4) | PAL    | Color        |



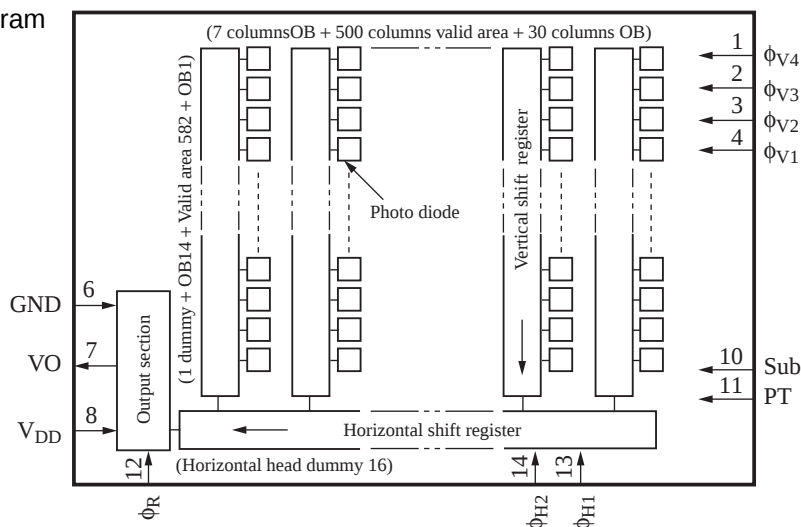
### Features

- High sensitivity, Low noise, Broad dynamic range
- Low smear, Low image lag, Electronic shutter function present
- No image distortion
- Small size enables design of compact equipment
- High reliability, 14-pin plastic package

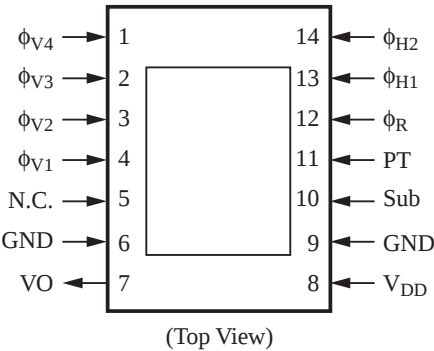
### Applications

- Compact lightweight camcorders. Cameras for surveillance, measurement, and medical use

### Block Diagram



■ Pin Assignments



■ Pin Descriptions

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

# Absolute Maximum Ratings and Operating Conditions

| Parameter                 |      | Symbol                            | Rating              |      | Operating condition |       |       | Unit |
|---------------------------|------|-----------------------------------|---------------------|------|---------------------|-------|-------|------|
|                           |      |                                   | min                 | max  | min                 | typ   | max   |      |
| Power supply voltage      |      | V <sub>DD</sub>                   | − 0.2               | 18.0 | 14.5                | 15.0  | 15.5  | V    |
| Protection P-well voltage |      | V <sub>PT</sub> <sup>*2</sup>     | − 10.0              | 0.2  | − 8.3               | − 8.0 | − 7.7 | V    |
| GND                       |      | GND                               | Reference voltage   |      | —                   | 0     | —     | V    |
| Reset                     | H-L  | V <sub>φR(H-L)</sub>              | —                   | 18.0 | 4.7                 | 5.0   | 5.3   | V    |
| pulse voltage             | Bias | V <sub>φR(Bias)</sub>             | Supplied internally |      |                     |       |       | V    |
| Horizontal register       |      | V <sub>φH1(H)</sub>               | —                   | 18.0 | 4.7                 | 5.0   | 5.3   | V    |
| clock pulse voltage 1     |      | V <sub>φH1(L)</sub>               | − 0.2               | —    | − 0.05              | 0     | 0.05  |      |
| Horizontal register       |      | V <sub>φH2(H)</sub>               | —                   | 18.0 | 4.7                 | 5.0   | 5.3   | V    |
| clock pulse voltage 2     |      | V <sub>φH2(L)</sub>               | − 0.2               | —    | − 0.05              | 0     | 0.05  |      |
| Vertical shift register   |      | V <sub>φV1(H)</sub> <sup>*2</sup> | —                   | 18.0 | 14.5                | 15.0  | 15.5  | V    |
| clock pulse voltage 1     |      | V <sub>φV1(M)</sub> <sup>*2</sup> | —                   | —    | − 0.05              | 0     | 0.05  |      |
|                           |      | V <sub>φV1(L)</sub> <sup>*2</sup> | − 9.0               | —    | − 8.3               | − 8.0 | − 7.7 |      |
| Vertical shift register   |      | V <sub>φV2(M)</sub> <sup>*2</sup> | —                   | 15.0 | − 0.05              | 0     | 0.05  | V    |
| clock pulse voltage 2     |      | V <sub>φV2(L)</sub> <sup>*2</sup> | − 9.0               | —    | − 8.3               | − 8.0 | − 7.7 |      |
| Vertical shift register   |      | V <sub>φV3(H)</sub> <sup>*2</sup> | —                   | 18.0 | 14.5                | 15.0  | 15.5  | V    |
| clock pulse voltage 3     |      | V <sub>φV3(M)</sub> <sup>*2</sup> | —                   | —    | − 0.05              | 0     | 0.05  |      |
|                           |      | V <sub>φV3(L)</sub> <sup>*2</sup> | − 9.0               | —    | − 8.3               | − 8.0 | − 7.7 |      |
| Vertical shift register   |      | V <sub>φV4(M)</sub> <sup>*2</sup> | —                   | 15.0 | − 0.05              | 0     | 0.05  | V    |
| clock pulse voltage 4     |      | V <sub>φV4(L)</sub> <sup>*2</sup> | − 9.0               | —    | − 8.3               | − 8.0 | − 7.7 |      |
| Substrate voltage         |      | V <sub>Sub</sub> <sup>*1</sup>    | Supplied internally |      |                     |       |       | V    |
|                           |      | ΔV <sub>Sub</sub> <sup>*3</sup>   | − 0.2               | 45.0 | 21.5                | 22.0  | 22.5  |      |
| Operating temperature     |      | T <sub>opr</sub>                  | − 10                | 70   | —                   | 25    | —     | °C   |
| Storage temperature       |      | T <sub>stg</sub>                  | − 30                | 80   | —                   | —     | —     | °C   |

Note)1. Standard light input defines

Standard light input is the one when the exposure is done at a lens aperture of F8, using a light source of 2856 K and 1050 nt, and placing a color temperature conversion filter LB-40 (HOYA) and an IR cutting filter CAW-500 (t = 2.5 mm) in the light path.

- \*1:  $V_{Sub}$  internal settings guarantee blooming at 400 times light input of the standard light input.
- \*2:  $V_{PT}$  is set so that the following conditions are set for VL of the vertical shift clock.

$$V_{PT} \leq VL$$

- \*3:  $V_{Sub}$  when using electronic shutter function

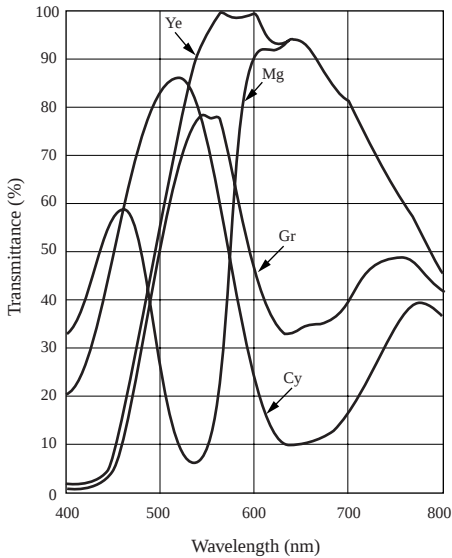


■ Optical Characteristics

| Part Number | Color<br>or<br>B/W | Effective<br>pixels |     | S/N<br>typ<br>(dB) | Saturation<br>output<br>typ<br>(mV) | Sensitivity<br>F8<br>typ<br>(mV) | Vertical<br>smear<br>Sm<br>typ(%) | Image lag<br>typ<br>(%) | Horizontal<br>resolution<br>typ<br>(TV-lines) | Vertical<br>resolution<br>typ<br>(TV-lines) |
|-------------|--------------------|---------------------|-----|--------------------|-------------------------------------|----------------------------------|-----------------------------------|-------------------------|-----------------------------------------------|---------------------------------------------|
|             |                    | H                   | V   |                    |                                     |                                  |                                   |                         |                                               |                                             |
| MN372132FT  | Color              | 500                 | 582 | 58                 | 650                                 | 330                              | 0.003                             | —                       | 330                                           | 420                                         |

■ Graphs of Characteristics

CCD On-Chip Filter Spectral Characteristics



■ Package Dimensions (Unit : mm)

- WDIP014-P-0400F

