

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	6 mm (type-1/3)	NTSC	Color

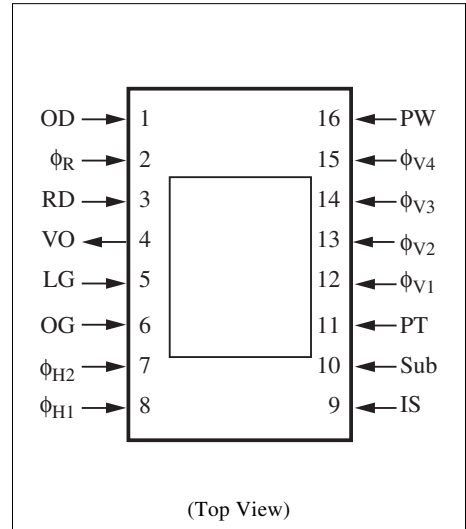
■ Features

- 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

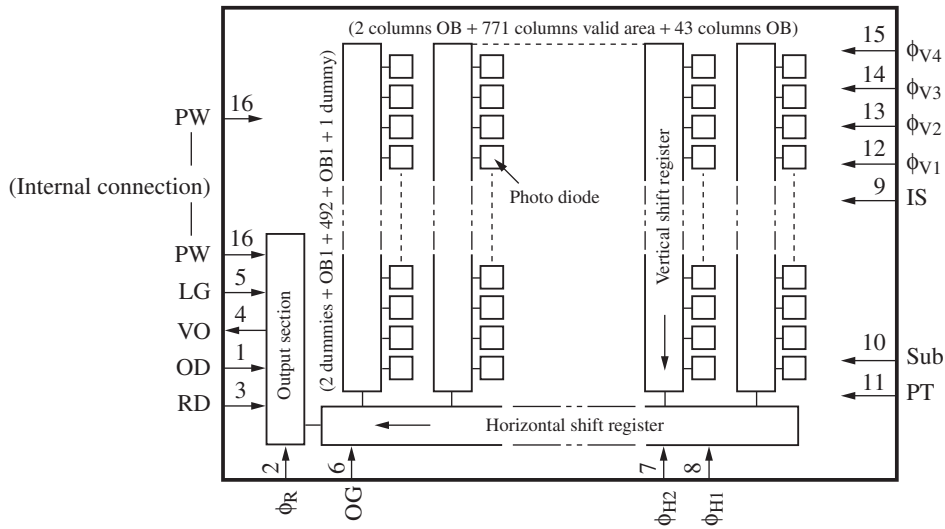
■ Applications

- Camcorders, surveillance cameras, door cameras

■ Pin Assignment



■ Block Diagram



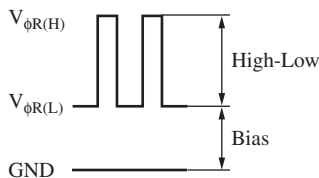
■ Pin Descriptions

Pin No.	Symbol	Descriptions	Pin No.	Symbol	Descriptions
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

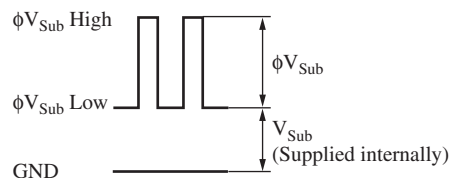
■ Absolute Maximum Ratings and Operating Conditions

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	
	ϕV_{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 $V_{\phi V(L)}$

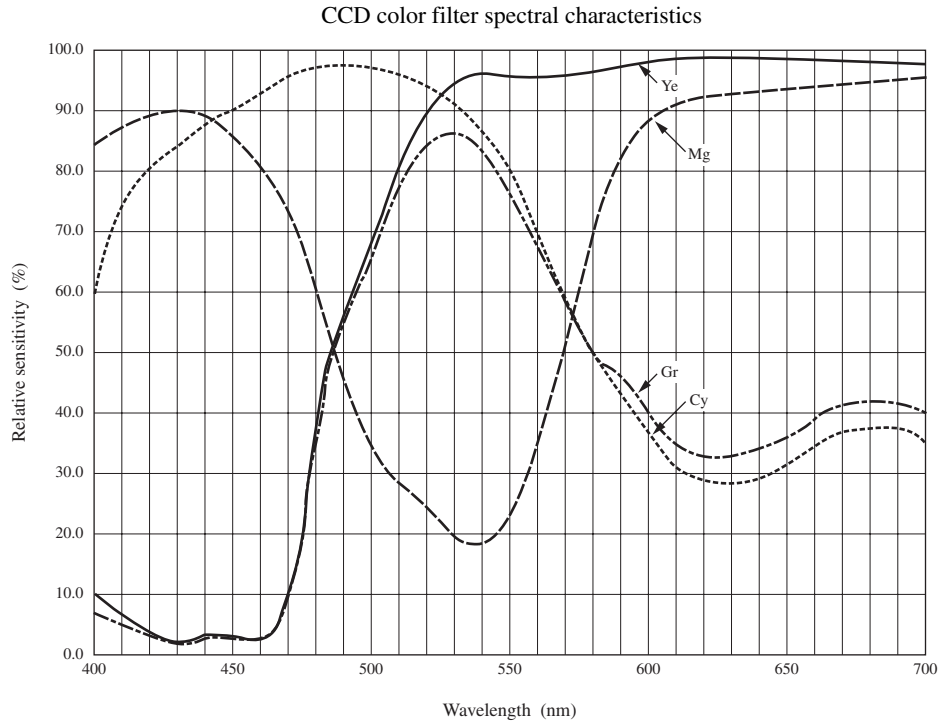
Set V_{PT} that is to meet the following conditions for VL voltage of the vertical shift clock waveform.

$$V_{PT} \leq VL (V_{\phi V1(L)} \text{ to } V_{\phi V4(L)})$$

■ Optical Characteristics

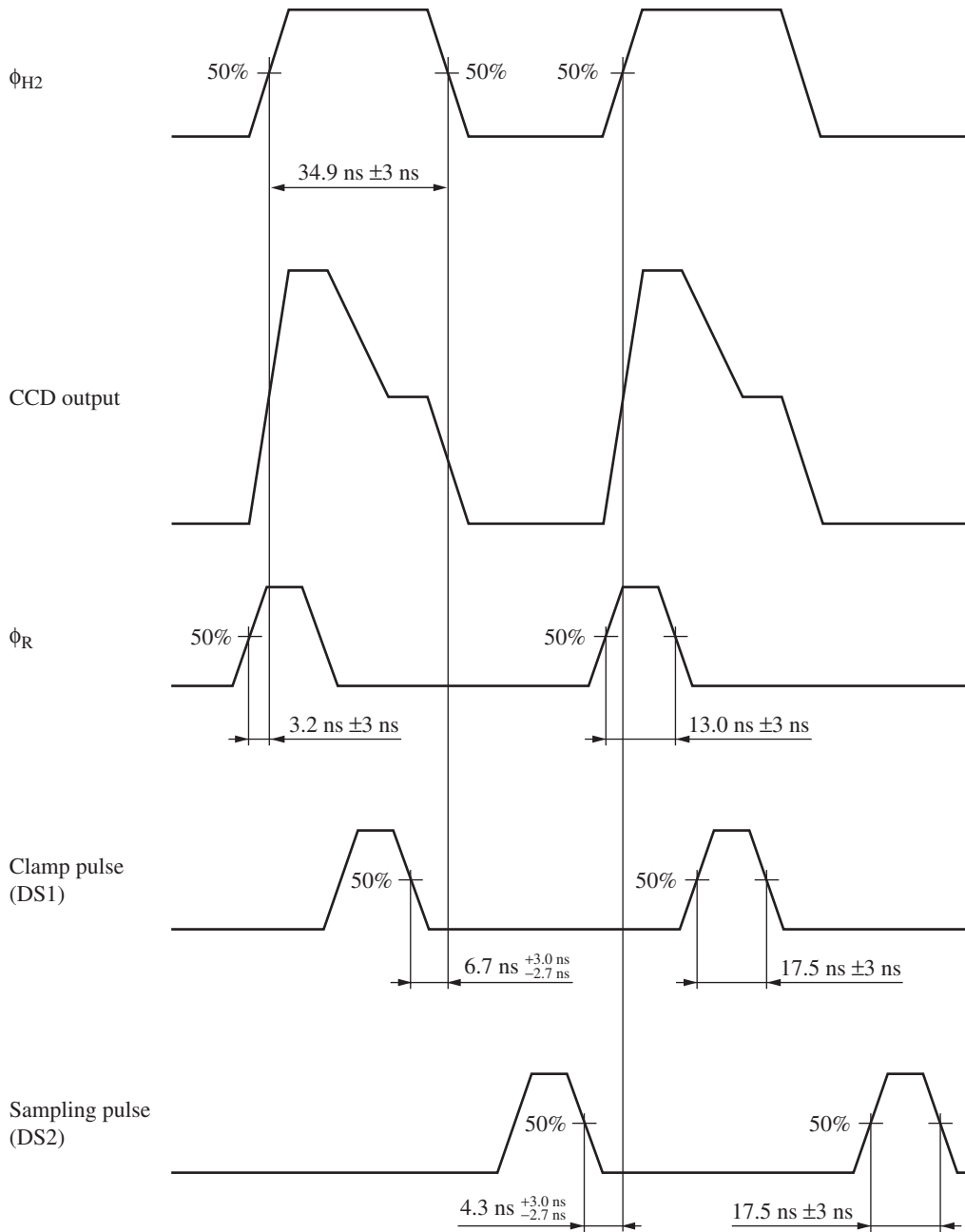
Part Number	Color or B/W	Effective pixels		Saturation output typ (mV)	Sensitivity F8 typ (mV)	Vertical smear Sm typ (dB)	Horizontal resolution typ (TV-lines)	Vertical resolution typ (TV-lines)
		H	V					
MN39143FT	Color	771	492	800	450	-100	480	350

■ Graph of Characteristics



■ Timing Diagram

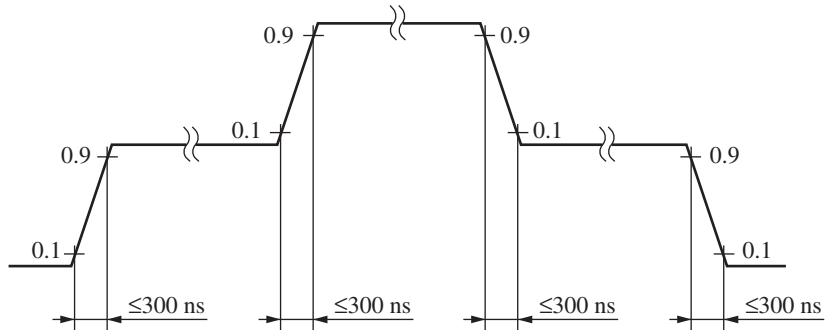
- High speed pulse timing



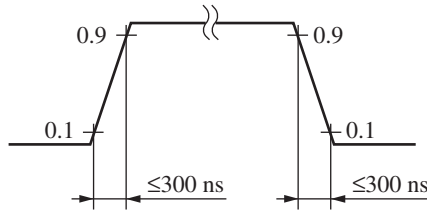
■ Timing Diagram (continued)

- Rise time and fall time of each pulse

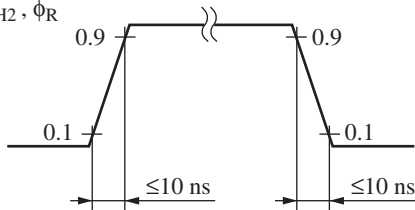
ϕ_{V1}, ϕ_{V3}



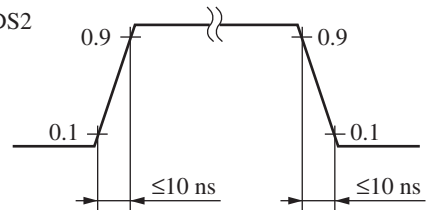
ϕ_{V2}, ϕ_{V4}



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

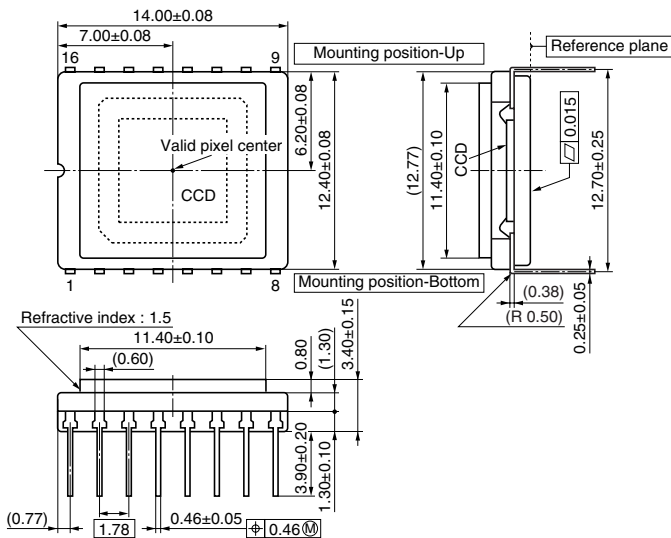


DS1, DS2



■ Package Dimensions (unit: mm)

- WDIP016-P-0500C



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