

MN3112SA

Vertical Driver for Video-Camera CCD Area-Image-Sensor

■ Overview

The MN3112SA is a vertical driver LSI incorporating four vertical driver channels and one sub driver channel for a 2-dimensional interline CCD image sensor.

The MN3112SA enables low current dissipation and the part reductions.

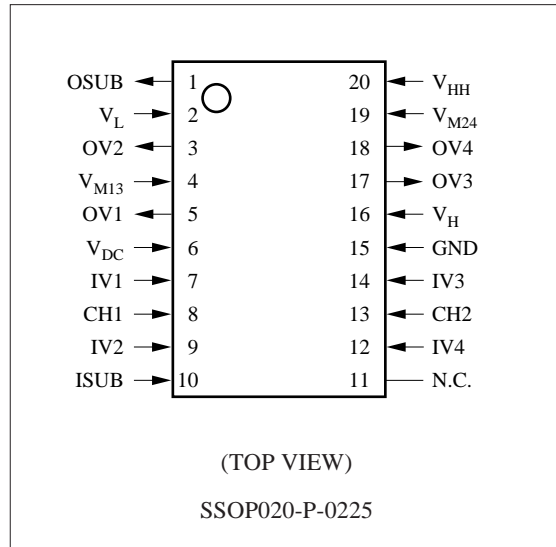
■ Features

- 3V power supply for input section

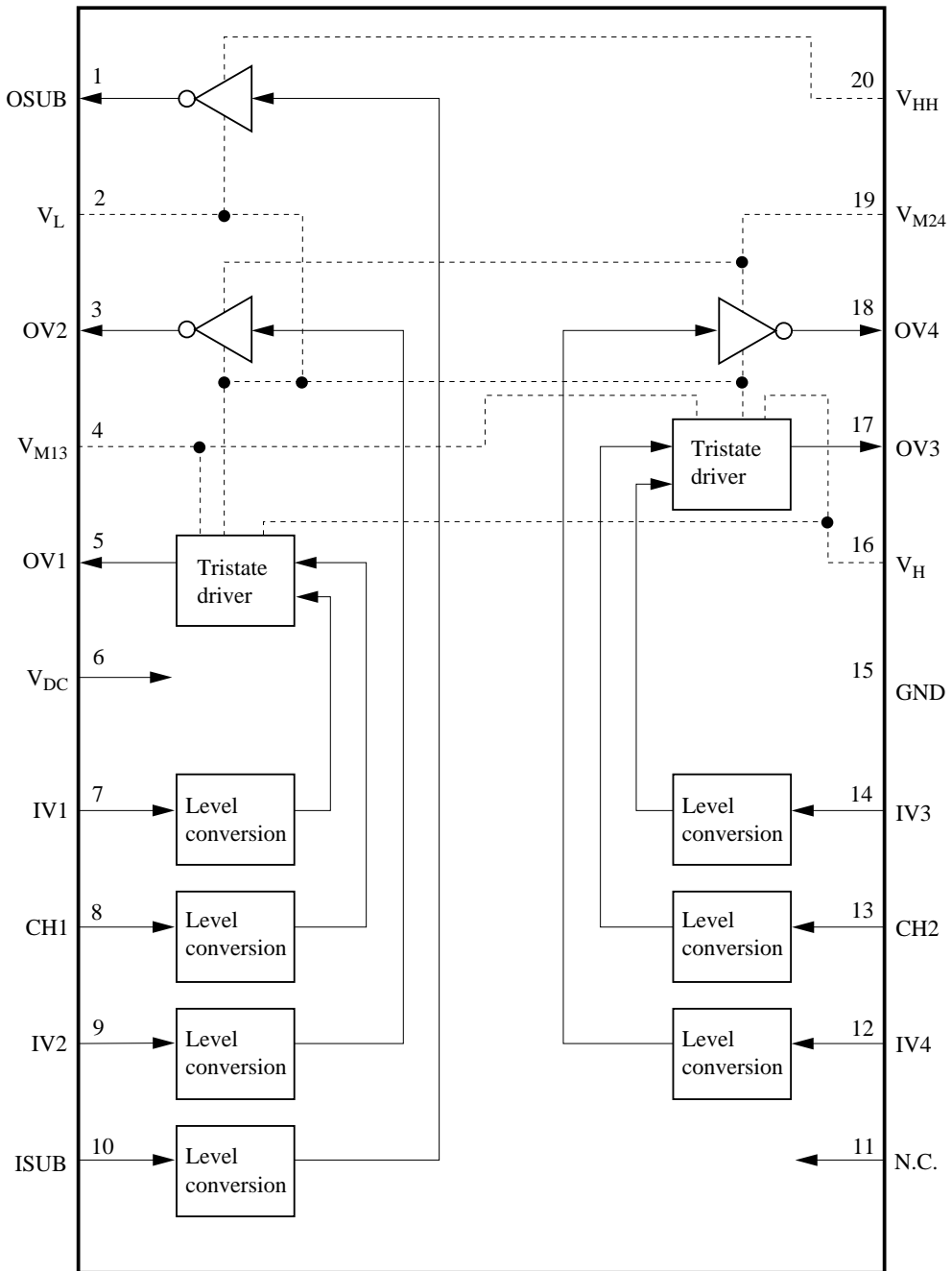
■ Applications

- Video cameras

■ Pin Assignment



■ Block Diagram



V_{DC} , V_L , GND : Common power supply

V_{M13} , V_{M24} : Binary and tristate independent power supplies for vertical driver section

V_{HH} , V_H : Independent power supplies for sub driver section and vertical driver section

■ Pin Descriptions

Pin No.	Symbol	Pin Name	I/O	Function Description
6	V_{DC}	Input section high-level power supply	I	5V high-level input
15	GND	Input section low-level power supply	I	5V low-level input
16	V_H	Vertical driver section high-level power supply	I	High-level input at high-voltage section
20	V_{HH}	SUB driver section high-level power supply	I	High-level input at high-voltage section
4 19	V_{M13} V_{M24}	Middle-level power supply	I	Middle-level input at high-voltage section Input externally to both V_{M13} and V_{M24} .
2	V_L	Low-level power supply	I	Low-level input at high-voltage section
9	IV2	Transfer pulse input	I	Charge transfer pulse input pin
12	IV4	Transfer pulse input	I	Charge transfer pulse input pin
7	IV1	Transfer pulse input	I	Charge transfer pulse input pin
14	IV3	Transfer pulse input	I	Charge transfer pulse input pin
8	CH1	Charge pulse input	I	Charge read pulse input pin
13	CH1	Charge pulse input	I	Charge read pulse input pin
10	ISUB	SUB pulse input	I	Unwanted charge sourcing pulse input pin
18	OV4	Binary transfer pulse output	O	Binary transfer pulse output pin (V_{M24} , V_L)
3	OV2	Binary transfer pulse output	O	Binary transfer pulse output pin (V_{M24} , V_L)
17	OV3	Tristate transfer pulse output	O	Tristate transfer pulse output pin (V_H , V_{M13} , V_L)
5	OV1	Tristate transfer pulse output	O	Tristate transfer pulse output pin (V_H , V_{M13} , V_L)
1	OSUB	SUB pulse output	O	Unwanted charge sourcing pulse output pin (V_{HH} , V_L)
11	N.C.	No connection	—	

■ Functions

Binary transfer pulse (vertical driver section)

IV2	OV2
IV4	OV4
H	L
L	M

Tristate transfer pulse (vertical driver section)

CH1	IV1	OV1
CH2	IV3	OV3
H	H	L
	L	M
L	H	L
	L	H

*1 IV1, IV2, IV3, IV4, CH1, CH2

H: V_{DC}

L: GND

OV1, OV2, OV3, OV4

H: V_H

M: V_{M13} or V_{M24}

L: V_L

Unwanted charge sourcing pulse (SUB driver section)

ISUB	OSUB
H	L
L	H

*1 ISUB

H: V_{DC}

L: GND

OSUB

H: V_{HH}

L: V_L

■ Electrical Characteristics

(1) DC characteristics

$V_{HH}=18.0V$, $V_H=13.0V$, $V_{M13}=V_{M24}=1.0V$, $V_L=-7.0V$,

$V_{DC}=5.00V$, $GND=0.0V$, $T_a=-10^{\circ}C$ to $+70^{\circ}C$

Parameter	Symbol	Test Conditions	min	typ	max	Unit
Quiescent supply current	I_{DDST}	$V_I=GND$, $V_{DC}=3.0V$			2.5	mA
		$V_I=GND$, $V_{DC}=5.0V$			4	
Operating supply current	I_{DDDYN}	$V_I=GND$, V_{DC}			7	mA
Input pins IV1, IV2, IV3, IV4, CH1, CH2, ISUB						
Voltage "H" level	V_{IH}		$0.7 \times V_{DC}$		V_{DC}	V
Voltage "L" level	V_{IL}		GND		$0.3 \times V_{DC}$	V
Input leakage current	I_{LI}	$V_I=0$ to 5V			± 1	μA
Output pins 1 (binary output) OV2, OV4						
Output voltage middle level	V_{OM1}	$I_{OM1}=-1mA$	0.9		V_{M24}	V
Output voltage "L" level	V_{OL1}	$I_{OL1}=1mA$	V_L		—	V
Output on-resistance middle level	R_{ONM1}	$I_{OM1}=-50mA$			40	Ω
Output on-resistance "L" level	R_{ONL1}	$I_{OL1}=50mA$			40	Ω
Output pins 2 (tristate output) OV1, OV3						
Output voltage "H" level	V_{OH2}	$I_{OH2}=-1mA$	12.9		V_H	V
Output voltage middle level	V_{OM2}	$I_{OM2}=-1mA$	0.9		V_{M13}	V
Output voltage "L" level	V_{OL2}	$I_{OL2}=1mA$	V_L		—	V
Output on-resistance "H" level	R_{ONH2}	$I_{OH2}=-50mA$			50	Ω
Output on-resistance middle level	R_{ONM2}	$I_{OM2}=\pm 50mA$			40	Ω
Output on-resistance "L" level	R_{ONL2}	$I_{OL2}=50mA$			40	Ω
Output pin 3 (SUB output) OSUB						
Output voltage "H" level	V_{OHH3}	$I_{OHH3}=-1mA$	17.9		V_{HH}	V
Output voltage "L" level	V_{OL3}	$I_{OL3}=1mA$	V_L		—	V
Output on-resistance middle level	R_{ONHH3}	$I_{ONHH3}=-50mA$			50	Ω
Output on-resistance "L" level	R_{ONL3}	$I_{ONL3}=50mA$			40	Ω

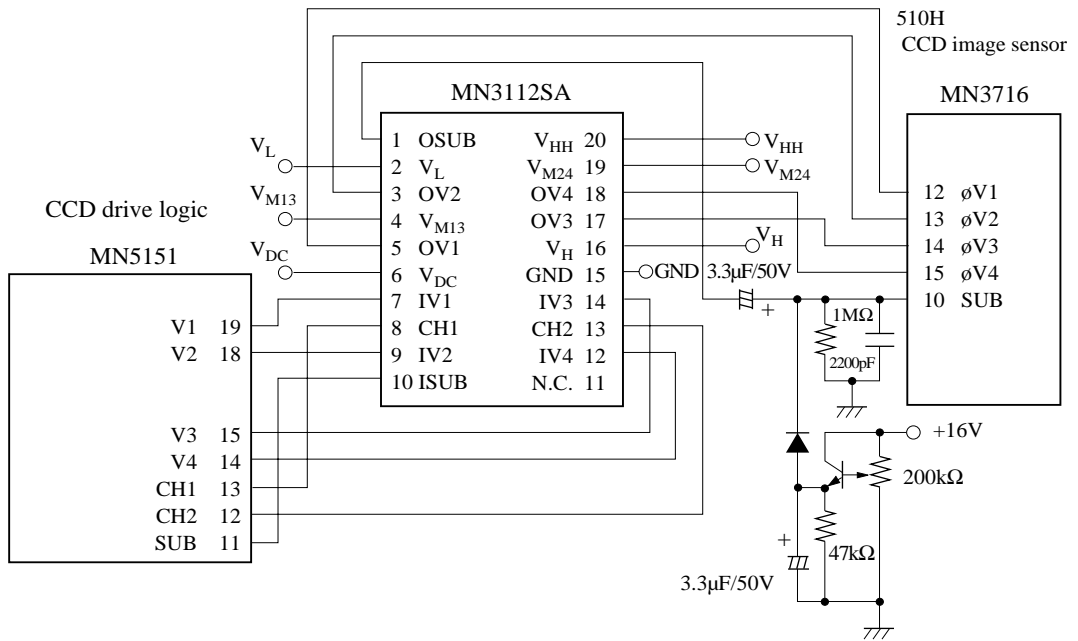
(2) AC characteristics

 $V_{HH}=18.0V$, $V_H=13.0V$, $V_{M13}=V_{M24}=1.0V$, $V_L=-7.0V$,

 $V_{DC}=3.0V$, $GND=0.0V$, $T_a=-10^{\circ}C$ to $+70^{\circ}C$

Parameter	Symbol	Test Conditions	min	typ	max	Unit
Output pins 1 (binary output)		OV2 , OV4				
Transmission delay time	t_{PLM} t_{PML}	No load "L" level — middle level		100	200	ns
Rise time	t_{TLM}			200	300	ns
Fall time	t_{TML}					
Output pins 2 (tristate output)		OV1 , OV3				
Transmission delay time	t_{PLM} t_{PML}	No load "L" level — middle level		100	200	ns
Transmission delay time	t_{TMH} t_{THM}	No load middle level — "H" level		200	400	ns
Rise time	t_{TLM}			200	300	ns
Fall time	t_{TML}					
Rise time	t_{TMH}			200	300	ns
Fall time	t_{THM}					
Output pin 3 (SUB output)		OSUB				
Transmission delay time	t_{PLHH} t_{PHHL}	No load "L" level — "H" level		100	200	ns
Rise time	t_{TLHH}			200	300	ns
Fall time	t_{THHL}					

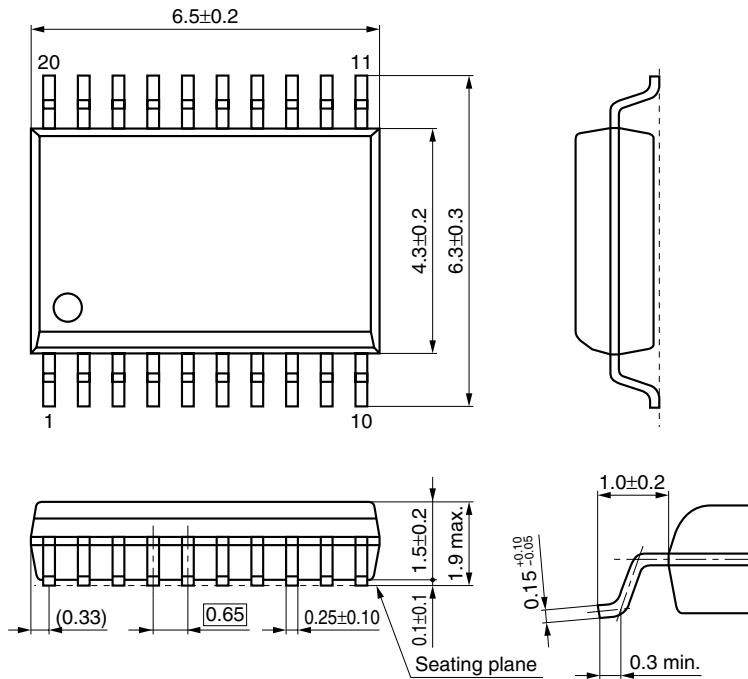
■ Application Circuit Example



Note *1: Connect a bypass capacitor as close as possible to each of the MN3112SA's power supply pins (V_{HH}, V_H, V_{M13}, V_{M24}, V_L, V_{DC}).

■ Package Dimensions (Unit: mm)

SSOP020-P-0225



Note) The package of this product will be changed to lead-free type (SSOP020-P-0225C). See the new package dimensions section later of this datasheet.

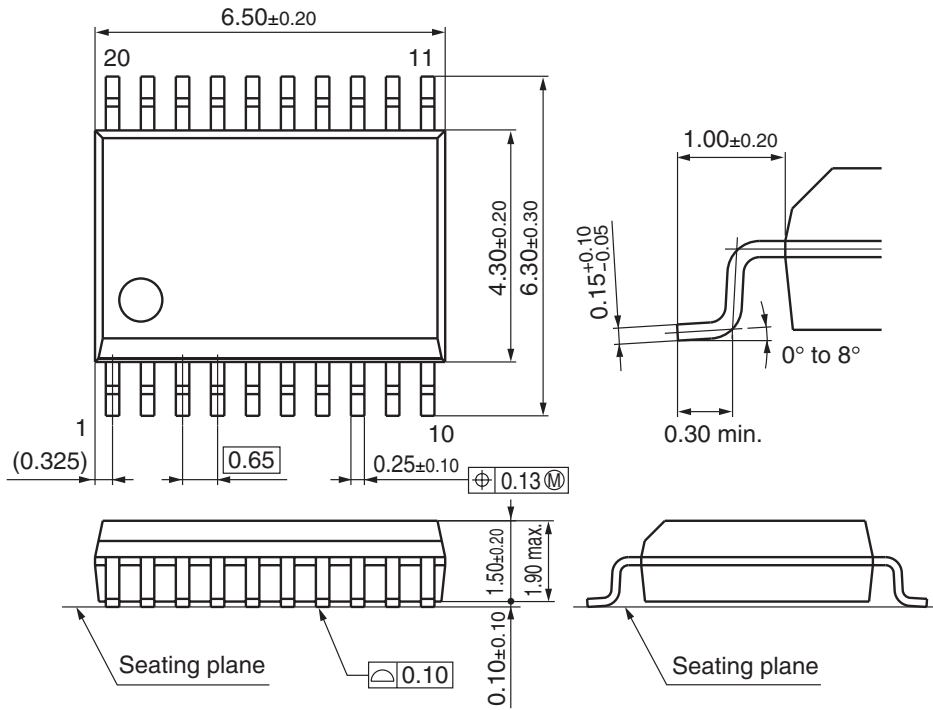
■ Usage Notes

- (1) When the sub driver is not used
 1. Connect V_{HH} (pin 20) to V_H (pin 16).
 2. Connect ISUB (pin 10) to V_{DC} (pin 6) or GND (pin 15).
 3. Make no connection for OSUB (pin 1).
- (2) Connect a bypass capacitor as close as possible to MN3112SA power supply pins V_{HH} (pin 20), V_H (pin 16), V_{M13} (pin 4), V_{M24} (pin 19), V_L (pin 2), and V_{DC} (pin 6).
- (3) Guarantee period after unsealing

The guarantee period after opening the dry-sealed packaging is three weeks under the environment conditions of $30^\circ\text{C}/70\%$ (temperature/humidity).
- (4) The recommended reflow temperature is 230°C .

■ New Package Dimensions (Unit: mm)

- SSOP020-P-0225C (Lead-free package)



Request for your special attention and precautions in using the technical information and semiconductors described in this material

- (1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.
- (2) The technical information described in this material is limited to showing representative characteristics and applied circuit examples of the products. It does not constitute the warranting of industrial property, the granting of relative rights, or the granting of any license.
- (3) The products described in this material are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
 - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
 - Any applications other than the standard applications intended.
- (4) The products and product specifications described in this material are subject to change without notice for reasons of modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (5) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
Even when the products are used within the guaranteed values, redundant design is recommended, so that such equipment may not violate relevant laws or regulations because of the function of our products.
- (6) When using products for which dry packing is required, observe the conditions (including shelf life and after-unpacking standby time) agreed upon when specification sheets are individually exchanged.
- (7) No part of this material may be reprinted or reproduced by any means without written permission from our company.

Please read the following notes before using the datasheets

- A. These materials are intended as a reference to assist customers with the selection of Panasonic semiconductor products best suited to their applications.
Due to modification or other reasons, any information contained in this material, such as available product types, technical data, and so on, is subject to change without notice.
Customers are advised to contact our semiconductor sales office and obtain the latest information before starting precise technical research and/or purchasing activities.
- B. Panasonic is endeavoring to continually improve the quality and reliability of these materials but there is always the possibility that further rectifications will be required in the future. Therefore, Panasonic will not assume any liability for any damages arising from any errors etc. that may appear in this material.
- C. These materials are solely intended for a customer's individual use.
Therefore, without the prior written approval of Panasonic, any other use such as reproducing, selling, or distributing this material to a third party, via the Internet or in any other way, is prohibited.