Ordering number : EN5078A

CMOS LSI

LC89901V

CMOS Driver IC for 1/5 and 1/6 Inch Image Sensors

Overview

The LC89901V is a high breakdown voltage CMOS vertical driver IC for 1/5 and 1/6 inch image sensors. Provision of a built-in level shifter means that an external clamp circuit is no longer required.

Applications

Surveillance cameras and image input equipment

Functions

CMOS driver IC for 1/5 and 1/6 inch image sensors

Features

- CMOS process fabrication for low power dissipation
- Built-in level shifter circuits to reduce the number of required peripheral circuits.
- Miniature package (SSOP-24)

Structure

- Inverter type drivers: 8 channels
  Input pulses are converted to $V_{CC}1$, $V_{CC}2$ and $V_{EE}1$, $V_{EE}2$ levels (inversion).
  These are drivers for image sensor imaging and storage sections.

- Inverter type driver: 1 channel
  Input pulses are converted to $V_{CC}N$ and $V_{EE}1$, $V_{EE}2$ levels (inversion).
  This circuit is an image sensor NSUB driver.

Package Dimensions

unit: mm

3175A-SSOP24

[LC89901V]

SANYO: SSOP24
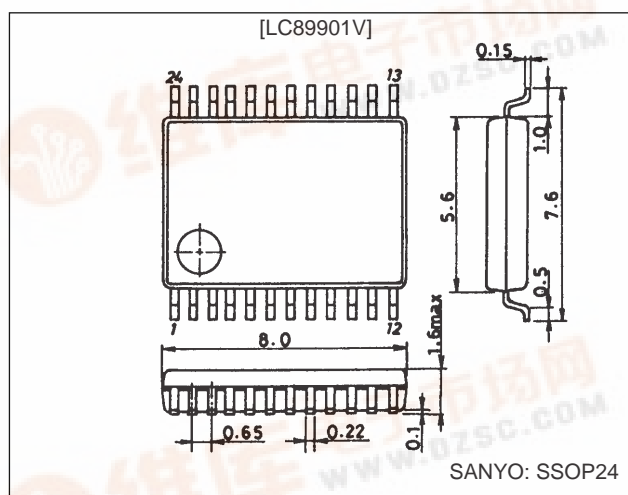
Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max	$V_{CC}1$, $V_{CC}2$, $V_{CC}N$	−0.3 to +6.0	V
	V_{EE} max	$V_{EE}1$, $V_{EE}2$	+0.3 to −11.0	V
Input voltage	V_{IN}	All input pins	−0.3 to V_{CC} + 0.3	V
Allowable power dissipation	Pd max		350	mA
Operating temperature	Topr		−10 to +70	°C
Storage temperature	Tstg		−40 to +125	°C

Allowable Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}	$V_{CC}1$, $V_{CC}2$, $V_{CC}N$: *$V_{CC}N \leq V_{CC}1$, $V_{CC}2$	4.5 to 5.5	V
	V_{EE}	$V_{EE}1$, $V_{EE}2$	0 to −10.5	V
Input voltage range	V_{IN}	All input pins	0 to V_{CC}	V

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Block Diagram
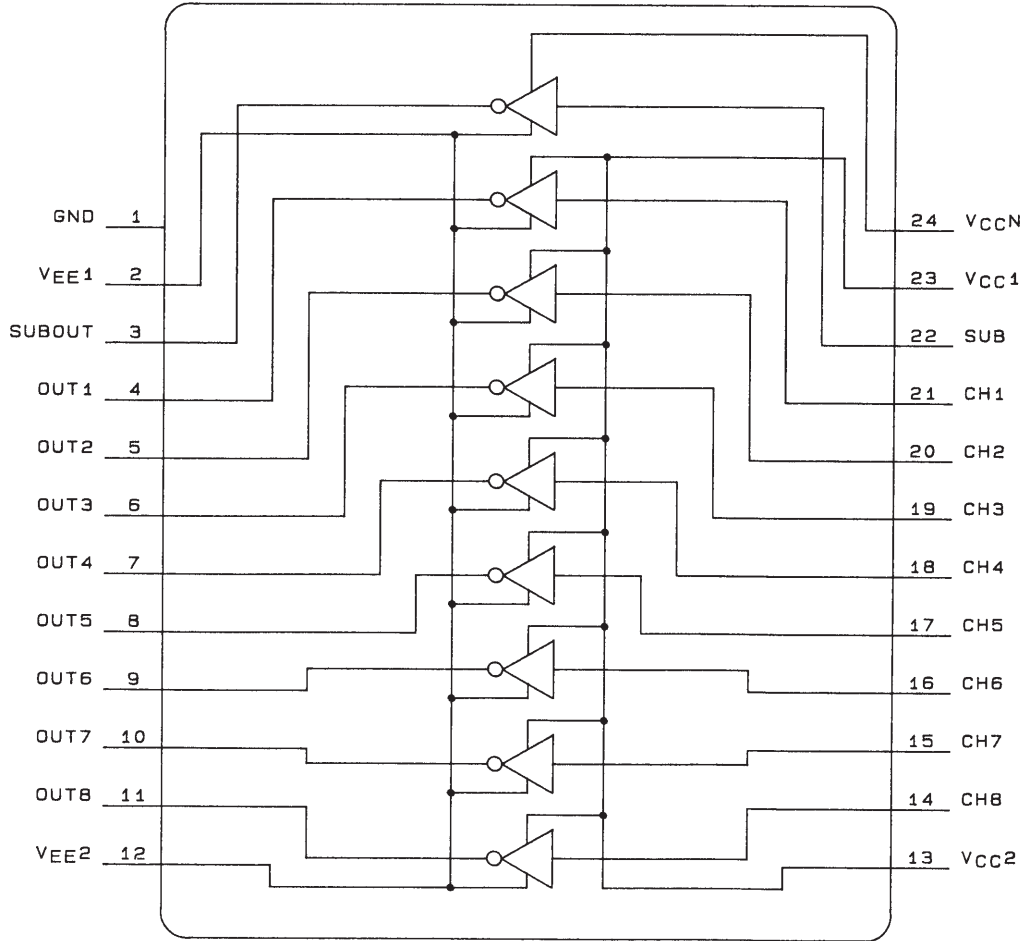
A03742

Electrical Characteristics at $Ta = 25°C$, $V_{CC}1$, $V_{CC}2$, $V_{CC}N = 5.0$ V, $V_{EE}1$, $V_{EE}2 = -10.0$ V

Parameter	Symbol	Conditions	min	typ	max	Unit
Input high level current	I_{IH}	All input pins, $V_{IN} = 5.0$ V		10		μA
Input low level current	I_{IL}	All input pins, $V_{IN} = 0$ V		5		nA
Current drain	$I_{CCH}+$	$V_{CC}1$, $V_{CC}2$, $V_{CC}N$, all input pins, $V_{IN} = 5.0$ V		1		μA
	$I_{CCH}-$	$V_{EE}1$, $V_{EE}2$, all input pins, $V_{IN} = 5.0$ V		−10		μA
	$I_{CCL}+$	$V_{CC}1$, $V_{CC}2$, $V_{CC}N$, all input pins, $V_{IN} = 0$ V		7		μA
	$I_{CCH}-$	$V_{EE}1$, $V_{EE}2$, all input pins, $V_{IN} = 0$ V		−2		μA
Output voltage	V_{OH}	All inputs, $V_{IN} = 0$ V		5.0		V
	V_{OL}	All inputs, $V_{IN} = 5.0$ V		−10.0		V
Operating output voltage*	$V_{OH}2$	Load = LC9997, input = LC99052		5.0		V
	$V_{OL}2$	Load = LC9997, input = LC99052		−10.0		V
Operating current drain*	$I_{CC}2+$	Load = LC9997, input = LC99052		1.62		mA
	$I_{CC}2-$	Load = LC9997, input = LC99052		1.61		mA

Note: Load conditions
    Load circuit

$$R_L = 18 \ \Omega, \ C_L = 780 \ pF$$

* Reference values for driving an LC9997 image sensor with pulses input from an LC99052 timing LSI.

Switching Characteristics at Ta = 25°C, $V_{CC}1$, $V_{CC}2$, $V_{CC}N$ = 5.0 V, $V_{EE}1$, $V_{EE}2$ = –10.0 V, f_{IN} = 3.58 MHz

Parameter	Symbol	Conditions	min	typ	max	Unit
Propagation delay Low level → high level tpLH	t_{PLH}	All output pins		23		ns
Propagation delay High level → low level tpHL	t_{PHL}	All output pins		31		ns
Rise time	t_r	All output pins		47		ns
Fall time	t_f	All output pins		42		ns

Switching Waveforms
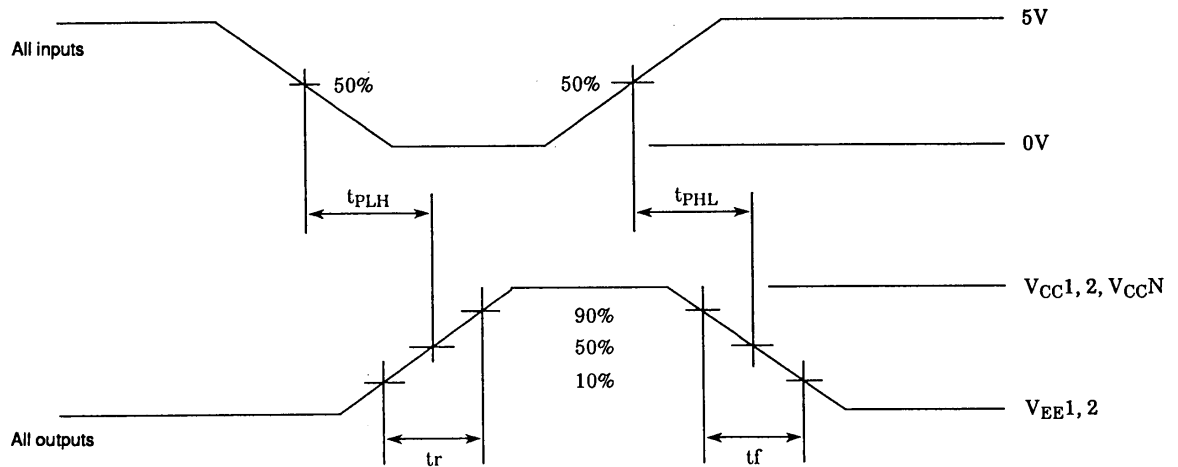
Truth table

Input		Output
	H	V_{OL}
	L	V_{OH}

Pin Functions

Pin No.	Pin	Function
1	GND	Ground
2	$V_{EE}1$	Negative power supply for setting the low level
3	SUBOUT	NSUB driver output
4	OUT1	Channel 1 driver output
5	OUT2	Channel 2 driver output
6	OUT3	Channel 3 driver output
7	OUT4	Channel 4 driver output
8	OUT5	Channel 5 driver output
9	OUT6	Channel 6 driver output
10	OUT7	Channel 7 driver output
11	OUT8	Channel 8 driver output
12	$V_{EE}2$	Negative power supply for setting the low level
13	$V_{CC}2$	Positive power supply for setting the high level
14	CH8	Channel 8 driver input
15	CH7	Channel 7 driver input
16	CH6	Channel 6 driver input
17	CH5	Channel 5 driver input
18	CH4	Channel 4 driver input
19	CH3	Channel 3 driver input
20	CH2	Channel 2 driver input
21	CH1	Channel 1 driver input
22	SUB	NSUB driver input
23	$V_{CC}1$	Positive power supply for setting the high level
24	$V_{CC}N$	NSUB driver positive power supply

Sample Application Circuit

This figure shows the block diagram of an image sensor based digital camera using the Sanyo LC99052–V64, LC99062–W50 and LC89901V.