

**LC89902V****CMOS Driver for VGA-Format Image Sensors****Overview**

The LC89902V is a vertical driver CMOS IC specifically designed for use with VGA-format CCD image sensors.

Applications

- Image input units and similar products

Features

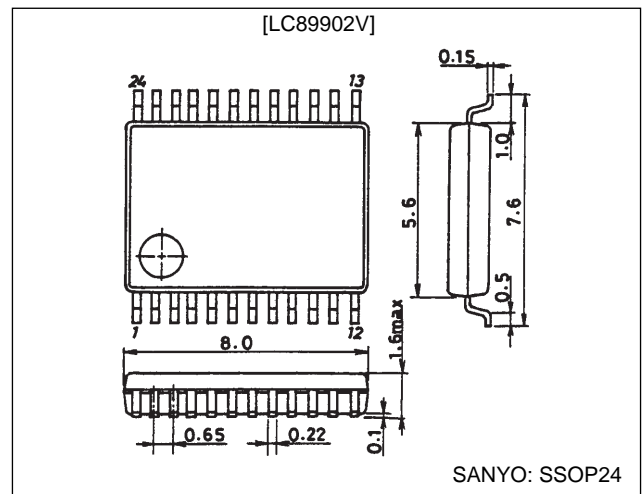
- CMOS structure supporting low power dissipation.
- Level shifter circuits provided on chip to minimize the number of external components required.
- Miniature package (24-pin SSOP)

Functions

- Inverting drivers: 6 channels
 - Converts input pulses to V_{CC1} , V_{CC2} , and V_{CC3} , as well as V_{EE1} and V_{EE2} levels (inverting).
 - Generates the drive levels required for the image sensor imaging and storage sections.
- Inverting drivers: 2 channels
 - These drivers convert input pulses to V_{CC1} , V_{CC2} , and V_{CC3} , as well as V_{EE1} and V_{EE2} levels (inverting).
 - These drivers generate the drive levels required for the image sensor transfer gate.

Package Dimensions

unit: mm

3175A-SSOP24**Specifications****Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$**

Parameter	Symbol	Condition	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$	$V_{CC1}, V_{CC2}, V_{CC3}$	-0.3 to +6.0	V
	$V_{EE \text{ max}}$	V_{EE1}, V_{EE2}	-11.0 to +0.3	V
Input and voltages	V_{IN}	All input pins	-0.3 to $V_{CC} + 0.3$	V
Allowable power dissipation	$P_d \text{ max}$		350	mA
Operating temperature	T_{opr}		-10 to +70	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +125	$^\circ\text{C}$

Allowable Operating Ranges at $T_a = 25^\circ\text{C}$

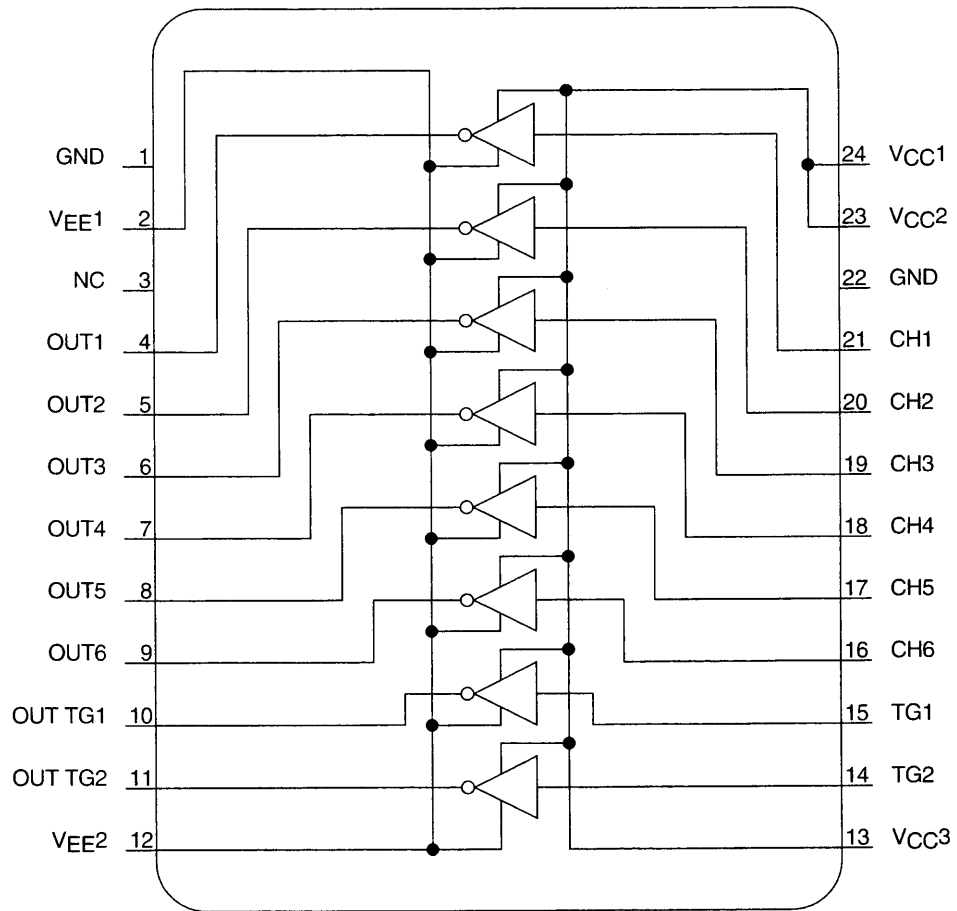
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}	$V_{CC1}, V_{CC2}, V_{CC3}$	4.5 to 5.5	V
	V_{EE}	V_{EE1}, V_{EE2}	-10.5 to 0	V
Input voltage range	V_{IN}	All input pins	0 to V_{CC}	V

SANYO Electric Co., Ltd. Semiconductor Business Headquarters

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

LC89902V

Block Diagram



A08857

LC89902V

Pin Functions

Pin No.	Pin name	Function
1	GND	Ground
2	V _{EE1}	Negative power supply used to set the low output level
3	NC	–
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	OUT TG1	Transfer gate 1 driver output
11	OUT YG2	Transfer gate 2 driver output
12	V _{EE2}	Negative power supply used to set the low output level
13	V _{CC3}	Positive power supply used to set the high output level
14	TG2	Transfer gate 2 driver input
15	TG1	Transfer gate 1 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	GND	Ground
23	V _{CC2}	Positive power supply used to set the high output level
24	V _{CC1}	Positive power supply used to set the high output level

Electrical Characteristics at Ta = 25°C, V_{CC1}, V_{CC2}, and V_{CC3} = 5.0 V, V_{EE1} and V_{EE2} = –10.0 V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input high-level current	I _{IH}	All input pins, V _{IN} = 5.0 V		10		μA
	I _{IL}	All input pins, V _{IN} = 0 V		5		nA
Supply current	I _{CCCH} ⁺	V _{CC1} , V _{CC2} , and V _{CC3} , all input pins, V _{IN} = 5.0 V		1		μA
	I _{CCCH} [–]	V _{EE1} and V _{EE2} , all input pins, V _{IN} = 5.0 V		–10		μA
	I _{CCCL} ⁺	V _{CC1} , V _{CC2} , and V _{CC3} , all input pins, V _{IN} = 0 V		7		μA
	I _{CCCL} [–]	V _{EE1} and V _{EE2} , all input pins, V _{IN} = 0 V		–2		μA
Output voltage	V _{OH}	All input pins, V _{IN} = 0 V		5.0		V
	V _{OL}	All input pins, V _{IN} = 5.0 V		–10		V
Output voltage under actual operating conditions	V _{OH2}	Load = LC99152, input = LC99055 *		5.0		V
	V _{OL2}	Load = LC99152, input = LC99055 *		–10		V
Output current under actual operating conditions	I _{CC2} ⁺	Load = LC99152, input = LC99055 *		1.62		mA
	I _{CC2} [–]	Load = LC99152, input = LC99055 *		1.61		mA

Note: * Values for when the LC99055 timing IC provides the input pulses and the LC99152 image sensor is driven. These values are provided for reference purposes only.

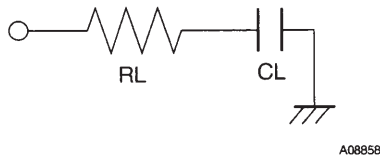
LC89902V

Switching Characteristics at $T_a = 25^\circ\text{C}$, V_{CC1} , V_{CC2} , and $V_{CC3} = 5.0\text{ V}$, V_{EE1} and $V_{EE2} = -10.0\text{ V}$, $f_{IN} = 3.58\text{ MHz}$

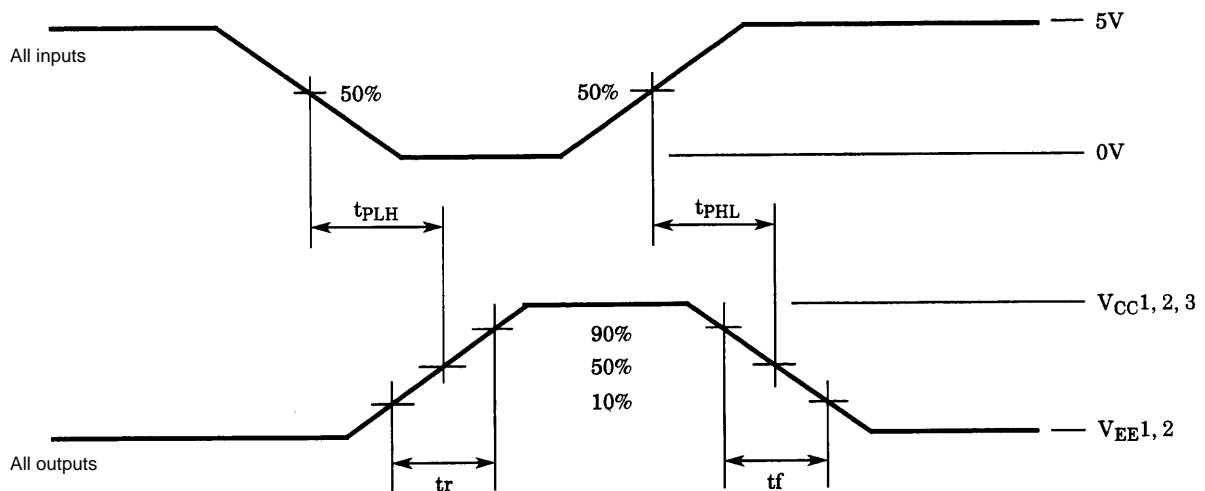
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Propagation delay time Low level \rightarrow high level	t_{PLH}	All output pins		23		ns
Propagation delay time High level \rightarrow low level	t_{PHL}	All output pins		31		ns
Rise time	t_r	All output pins		47		ns
Fall time	t_f	All output pins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

Note: Load conditions
 $R_L = 18\ \Omega$, $C_L = 780\text{ pF}$

Load Circuit



Switching Waveforms



Truth Table

		Output
		Input
	L	V_{OH}

Usage Notes

- Power supply application timing**
 When applying power to the LC89902V, either both power-supply voltages must be turned on at the same time or V_{CC} (+5 V) must be turned on before V_{EE} (-10 V) is turned on. The IC may be destroyed if V_{EE} is turned on first.
- Power supply noise elimination**
 Clock frequency noise may occur on the power supply lines due to the charge and discharge currents required to drive the CCD. Capacitors must be inserted both between V_{CC} and ground and between V_{EE} and ground to eliminate noise from the power supply lines. These capacitors must have values of at least 47 μF .

- No products described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure of which may directly or indirectly cause injury, death or property loss.
- Anyone purchasing any products described or contained herein for an above-mentioned use shall:
 - ① Accept full responsibility and indemnify and defend SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors and all their officers and employees, jointly and severally, against any and all claims and litigation and all damages, cost and expenses associated with such use:
 - ② Not impose any responsibility for any fault or negligence which may be cited in any such claim or litigation on SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors or any of their officers and employees jointly or severally.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of September, 1997. Specifications and information herein are subject to change without notice.