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# LV5609V

Bi-CMOS LSI

## Vertical Clock Driver for CCD

### Overview

The LV5609V is vertical clock driver for CCD.

### Functions

- Ternary output ×2ch
- Binary output ×2ch
- SHT output ×1ch
- Output ON resistance : 30Ω typ

### Specifications

**Absolute Maximum Ratings** at Ta = 25°C, V<sub>SS</sub> = VM = 0V

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V <sub>DD</sub> max		6	V
	V <sub>H</sub> max		20	V
	V <sub>L</sub> max		-10	V
	V <sub>H</sub> -V <sub>L</sub> max		24	V
Allowable power dissipation	P <sub>d</sub> max	with specified substrate *	0.67	W
Operating temperature	T <sub>opr</sub>		-20 to +80	°C
Storage temperature	T <sub>stg</sub>		-40 to +125	°C

\* : Specified substrate : 114.3×76.1×1.6mm<sup>3</sup>, glass epoxy board

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

**Allowable Operating Ratings** at Ta = 25°C, V<sub>SS</sub> = VM = 0V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply voltage	V <sub>DD</sub>		2.0	3.3	5.5	V
	V <sub>H</sub>			15	17	V
	V <sub>L</sub>		-8.5	-7.5	-4	V
	V <sub>H</sub> -V <sub>L</sub>				23.5	V
CMOS input High voltage	V <sub>INH</sub>		0.8V <sub>DD</sub>		V <sub>DD</sub>	V
CMOS input Low voltage	V <sub>INL</sub>		-0.1		0.4	V

# LV5609V

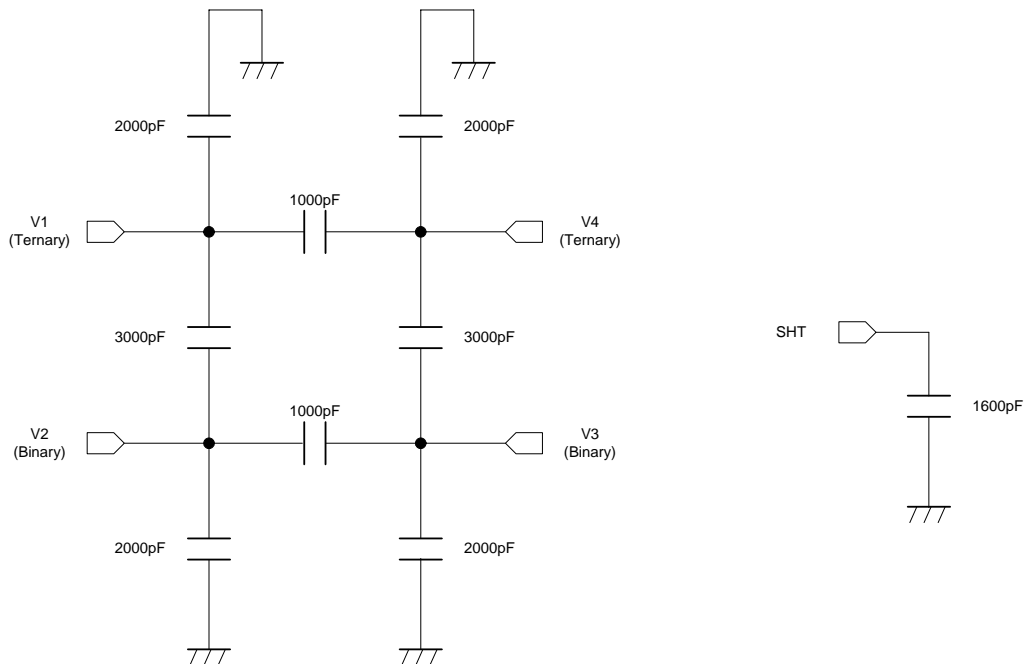
**Electrical Characteristics** at  $T_a = 25^\circ\text{C}$ ,  $V_{DD} = 3.3\text{V}$ ,  $V_{SS} = 0\text{V}$ ,  $V_H = 15\text{V}$ ,  $V_L = -7.5\text{V}$ ,  $V_M = 0\text{V}$ ,

Unless otherwise specified

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Static current drain	$I_{DD}$	$V_{DD}$ pin			1	$\mu\text{A}$
	$I_H$	$V_H$ pin			10	$\mu\text{A}$
	$I_L$	$V_L$ pin			1	$\mu\text{A}$
Dynamic current drain	$I_{DD}$	$V_{DD}$ pin See *1 and *2.			1	$\text{mA}$
	$I_H$	$V_H$ pin See *1 and *2.		2.4	4.5	$\text{mA}$
	$I_L$	$V_L$ pin See *1 and *2.		3	5	$\text{mA}$
Output ON resistance	$R_L$	$I_O = +10\text{mA}$		20	30	$\Omega$
	$R_M$	$I_O = \pm 10\text{mA}$		30	45	$\Omega$
	$R_H$	$I_O = -10\text{mA}$		30	40	$\Omega$
	$R_{SHT}$	$I_O = -10\text{mA}$		30	40	$\Omega$
Propagation delay time	$T_{PLM}$	No load			200	$\text{ns}$
	$T_{PMH}$	No load			200	$\text{ns}$
	$T_{PLH}$	No load			200	$\text{ns}$
	$T_{PML}$	No load			200	$\text{ns}$
	$T_{PHM}$	No load			200	$\text{ns}$
	$T_{PHL}$	No load			200	$\text{ns}$
Rise time	$T_{TLM}$	$V_L \rightarrow V_M$ $V_1, V_3$ See *1.			800	$\text{ns}$
		$V_L \rightarrow V_M$ $V_2, V_4$ See *1.			800	$\text{ns}$
	$T_{TMH}$	$V_M \rightarrow V_L$ $V_1, V_3$ See *1.			800	$\text{ns}$
	$T_{TLH}$	$V_L \rightarrow V_H$ SHT See *1.			200	$\text{ns}$
Fall time	$T_{TML}$	$V_M \rightarrow V_L$ $V_1, V_3$ See *1.			800	$\text{ns}$
		$V_M \rightarrow V_L$ $V_2, V_4$ See *1.			800	$\text{ns}$
	$T_{THM}$	$V_H \rightarrow V_M$ $V_1, V_3$ See *1.			800	$\text{ns}$
	$T_{THL}$	$V_H \rightarrow V_L$ SHT See *1.			200	$\text{ns}$

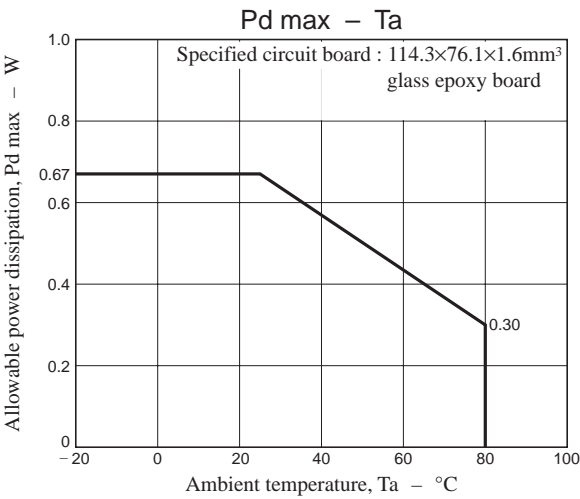
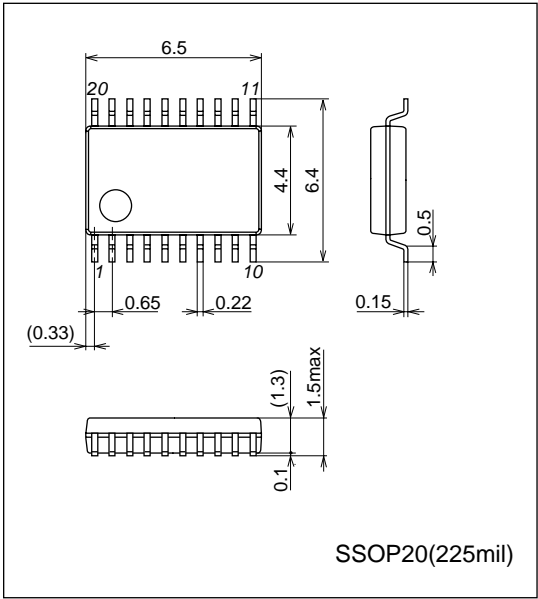
\*1 : Refer to the CCD equivalent load shown below.

\*2 : Refer to the timing waveform on Page 7.



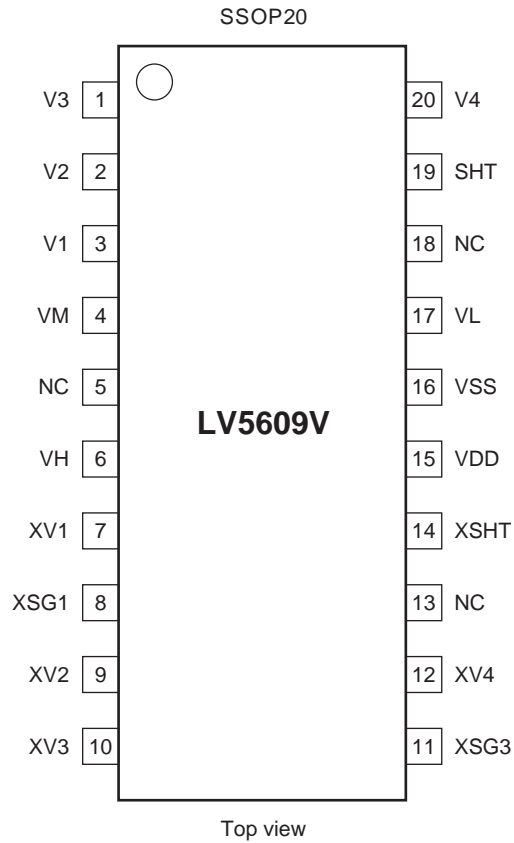
Package Dimensions

unit : mm (typ)  
3179C



# LV5609V

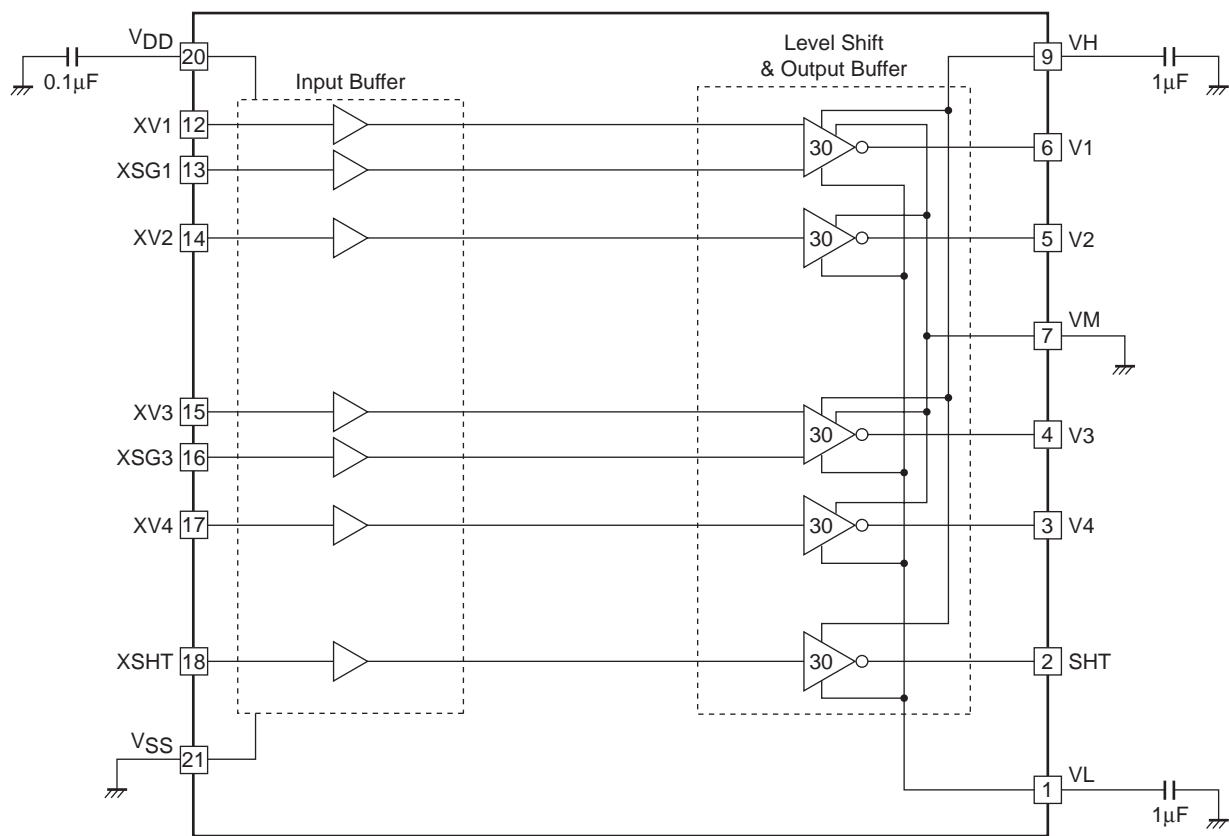
## Pin Assignment



## Pin Function

Pin No.	Name	Mode
1	V3	Level shift output (ternary VH, VM, VL)
2	V2	Level shift output (binary VM, VL)
3	V1	Level shift output (ternary VH, VM, VL)
4	VM	GND for output
5	NC	
6	VH	Hi power supply (15V system) for output
7	XV1	V1 transfer pulse input
8	XSG1	V1 read pulse input
9	XV2	V2 transfer pulse input
10	XV3	V3 transfer pulse input
11	XSG3	V3 read pulse input
12	XV4	V4 transfer pulse input
13	NC1	
14	XSHT	SHT pulse input
15	VDD	Power supply (3.3V system) for input buffer
16	VSS	GND for input buffer
17	VL	LO power supply (-7.5V system) for output
18	NC	
19	SHT	Level shift output (binary VH, VL)
20	V4	Level shift output (ternary VM, VL)

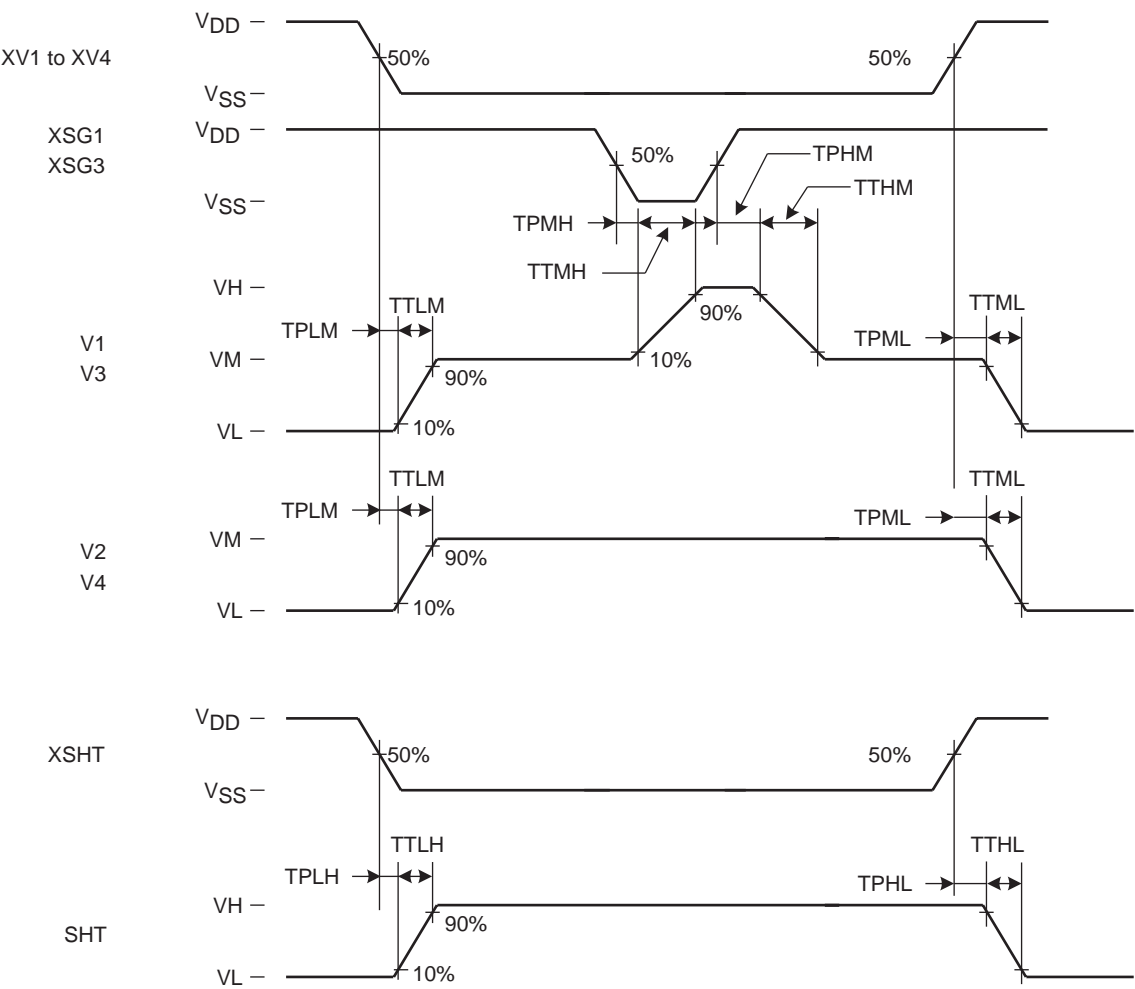
Block Diagram



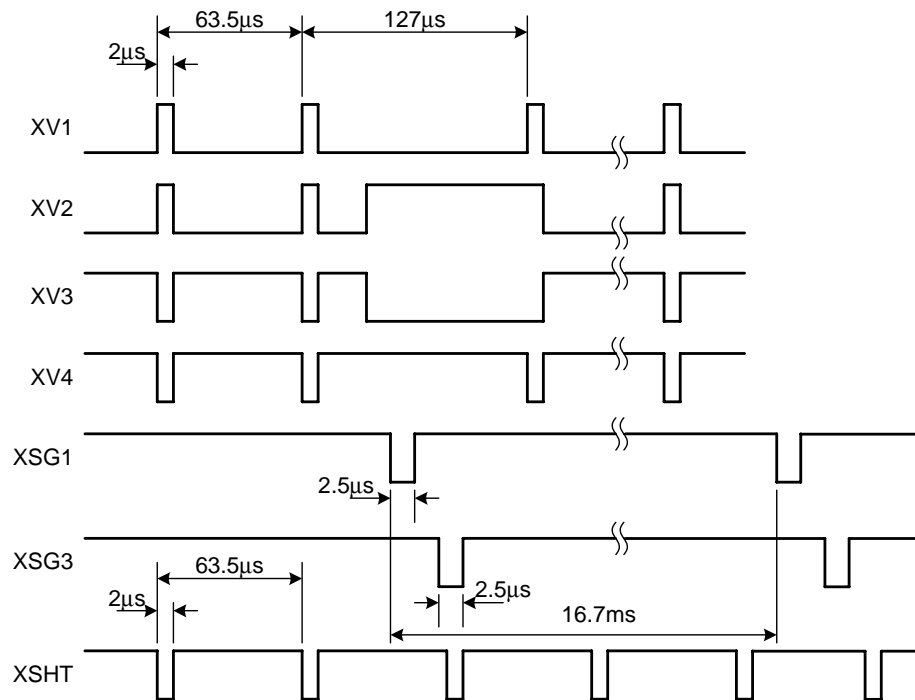
Logical Function Table

Input				Output		
XV1 XV3	XSG1 XSG3	XV2 XV4	XSHT	V1 V3	V2 V4	SHT
L	L	X	X	VH	X	X
L	H	X	X	VM	X	X
H	L	X	X	VL	X	X
H	H	X	X	VL	X	X
X	X	L	X	X	VM	X
X	X	H	X	X	VL	X
X	X	X	L	X	X	VH
X	X	X	H	X	X	VL

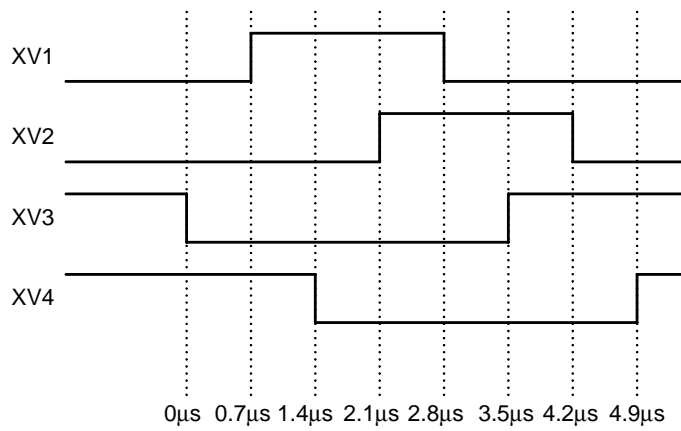
Timing Chart



CCD Equivalent Load Measurement Timing Waveform



Enlarged View of overlapped portion



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