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LV5609LP

Bi-CMOS LSI

Vertical Clock Driver for CCD

Overview

The LV5609LP 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 $T_a = 25^\circ\text{C}$, $V_{SS} = V_M = 0\text{V}$

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|--------------|----------------------------|-------------|------|
| Maximum supply voltage | V_{DD} max | | 6 | V |
| | VH max | | 20 | V |
| | VL max | | -10 | V |
| | VH-VL max | | 24 | V |
| Allowable power dissipation | P_d max | with specified substrate * | 0.8 | W |
| Operating temperature | T_{opr} | | -20 to +80 | °C |
| Storage temperature | T_{stg} | | -40 to +125 | °C |

* : Specified substrate : 40×50×0.8mm³, glass epoxy four-layer (2S2P) 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 $T_a = 25^\circ\text{C}$, $V_{SS} = V_M = 0\text{V}$

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|-------------------------|-----------|------------|-------------|------|----------|------|
| | | | min | typ | max | |
| Supply voltage | V_{DD} | | 2.0 | 3.3 | 5.5 | V |
| | VH | | | 15 | 17 | V |
| | VL | | -8.5 | -7.5 | -4 | V |
| | VH-VL | | | | 23.5 | V |
| CMOS input High voltage | V_{INH} | | $0.8V_{DD}$ | | V_{DD} | V |
| CMOS input Low voltage | V_{INL} | | -0.1 | | 0.4 | V |

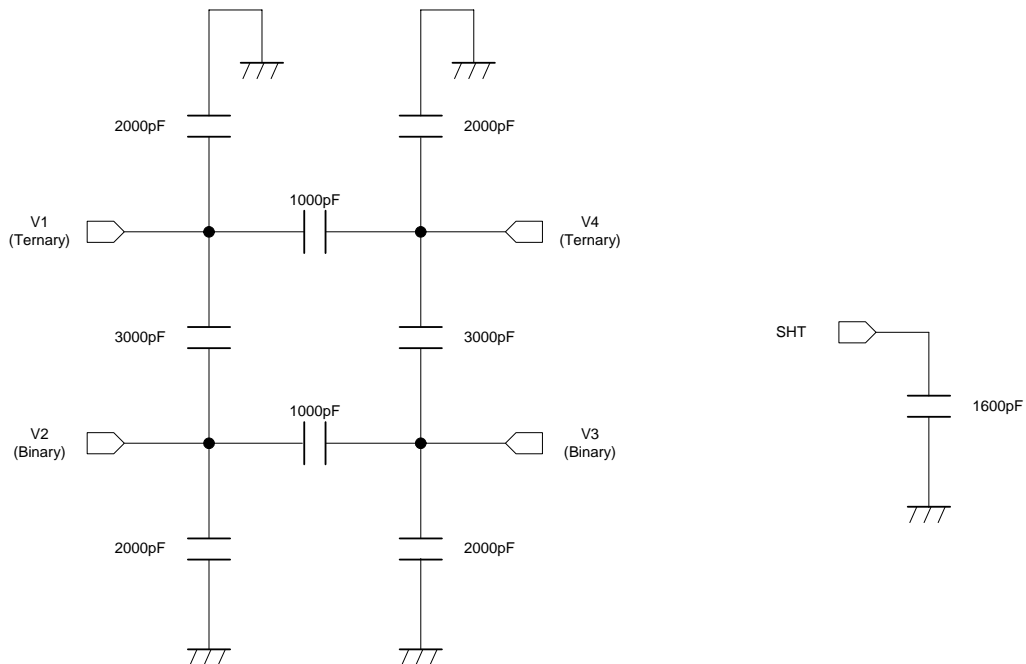
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Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{DD} = 3.3\text{V}$, $V_{SS} = 0\text{V}$, $V_H = 15\text{V}$, $V_L = -7.5\text{V}$, $V_M = 0\text{V}$,
Unless otherwise specified

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

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

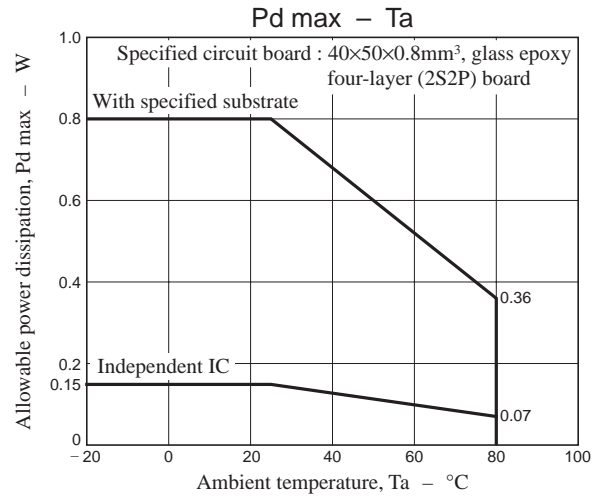
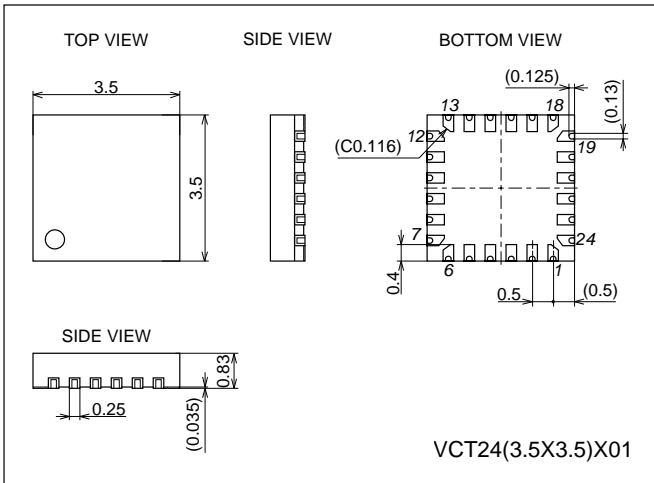
*2 : Refer to the timing waveform on Page 7.



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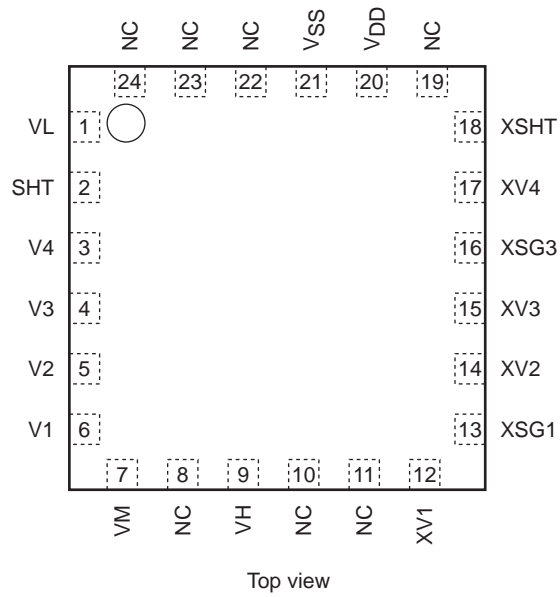
Package Dimensions

unit : mm (typ)
3322



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Pin Assignment

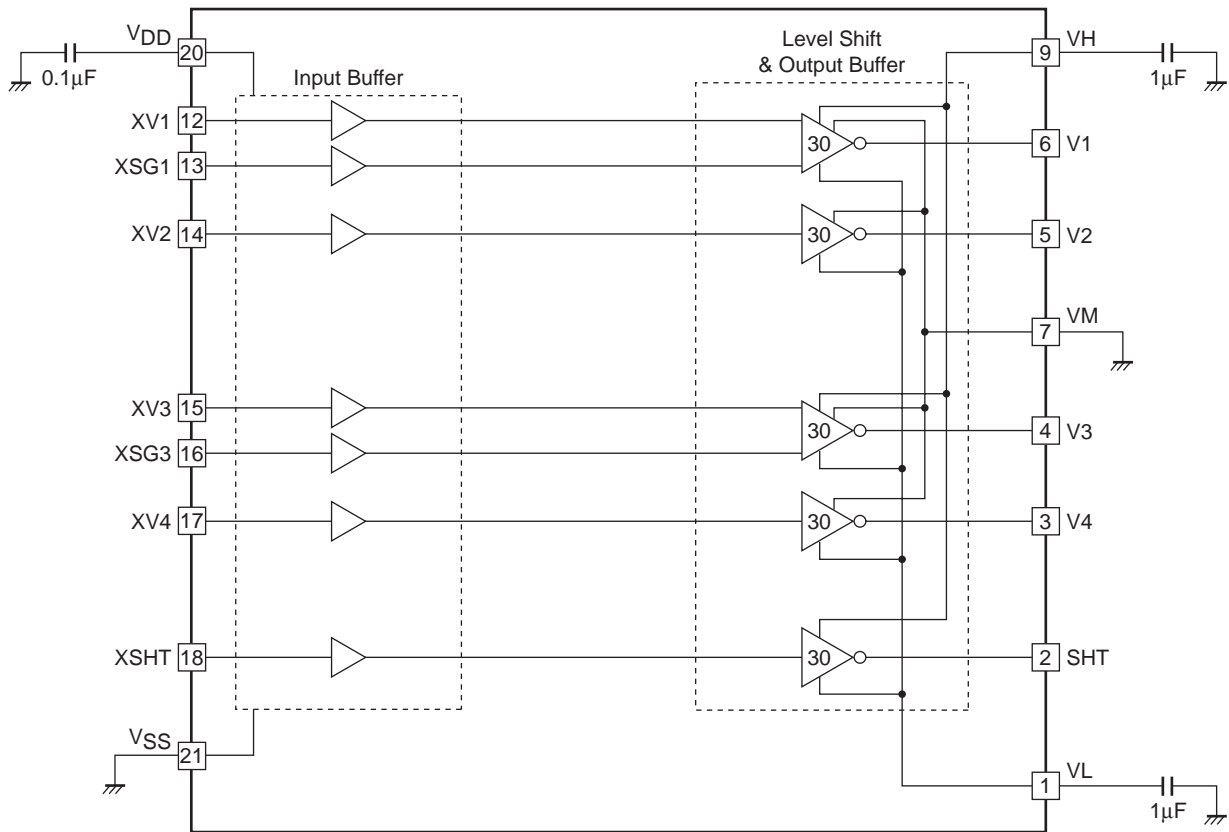


Pin Function

| Pin No. | Name | Mode |
|---------|-----------------|---|
| 1 | VL | Lo power for output (-7.5V system) |
| 2 | SHT | Level shift output (binary VH, VL) |
| 3 | V4 | Level shift output (binary VM, VL) |
| 4 | V3 | Level shift output (ternary VH, VM, VL) |
| 5 | V2 | Level shift output (binary VM, VL) |
| 6 | V1 | Level shift output (ternary VH, VM, VL) |
| 7 | VM | GND for output |
| 8 | NC | |
| 9 | VH | Hi power supply for output (15V system) |
| 10 | NC | |
| 11 | NC | |
| 12 | XV1 | V1 transfer pulse input |
| 13 | XSG1 | V1 read pulse input |
| 14 | XV2 | V2 transfer pulse input |
| 15 | XV3 | V3 transfer pulse input |
| 16 | XSG3 | V3 read pulse input |
| 17 | XV4 | V4 transfer pulse input |
| 18 | XSHT | SHT pulse input |
| 19 | NC | |
| 20 | V _{DD} | Power supply for input buffer (3.3V system) |
| 21 | V _{SS} | GND for input buffer |
| 22 | NC | |
| 23 | NC | |
| 24 | NC | |

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Block Diagram

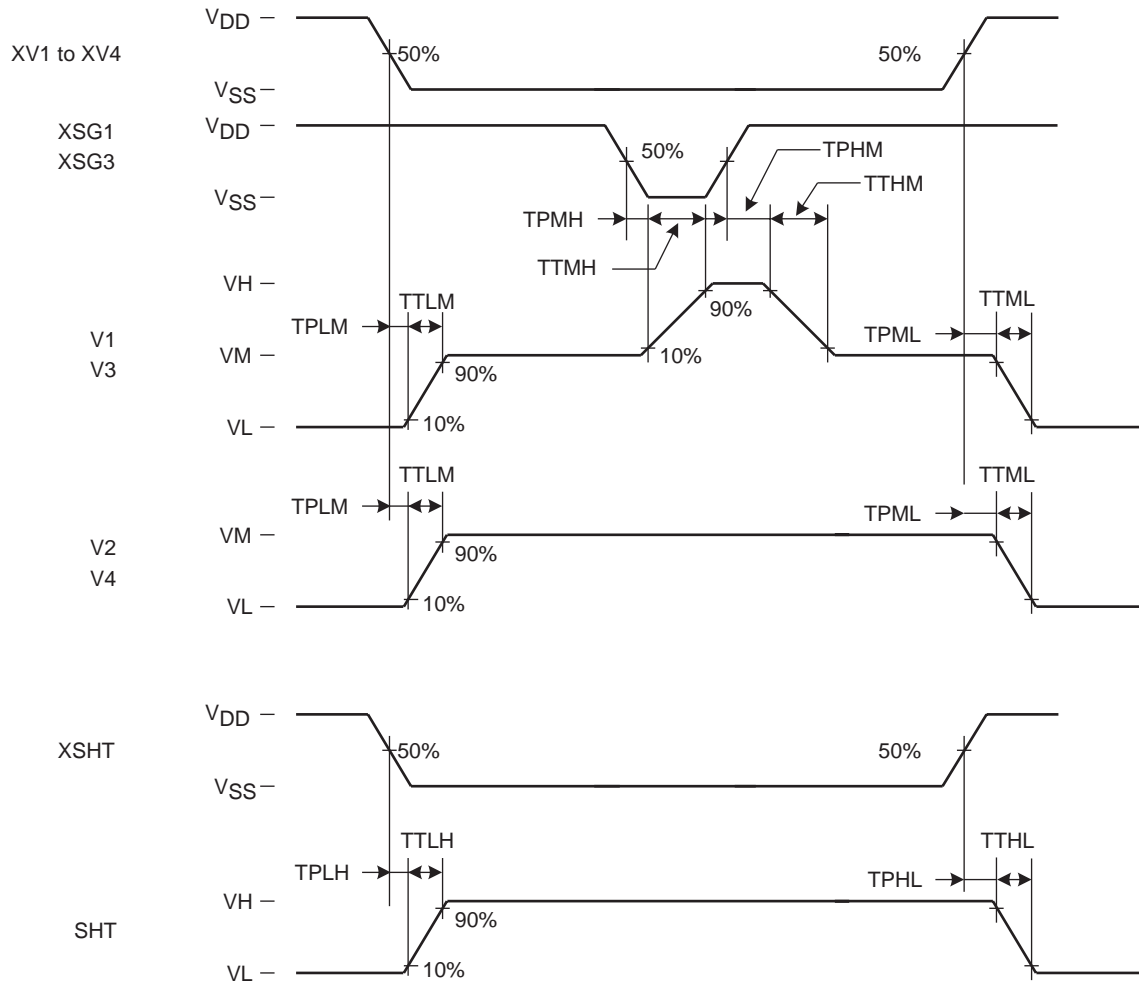


Logical Function Table

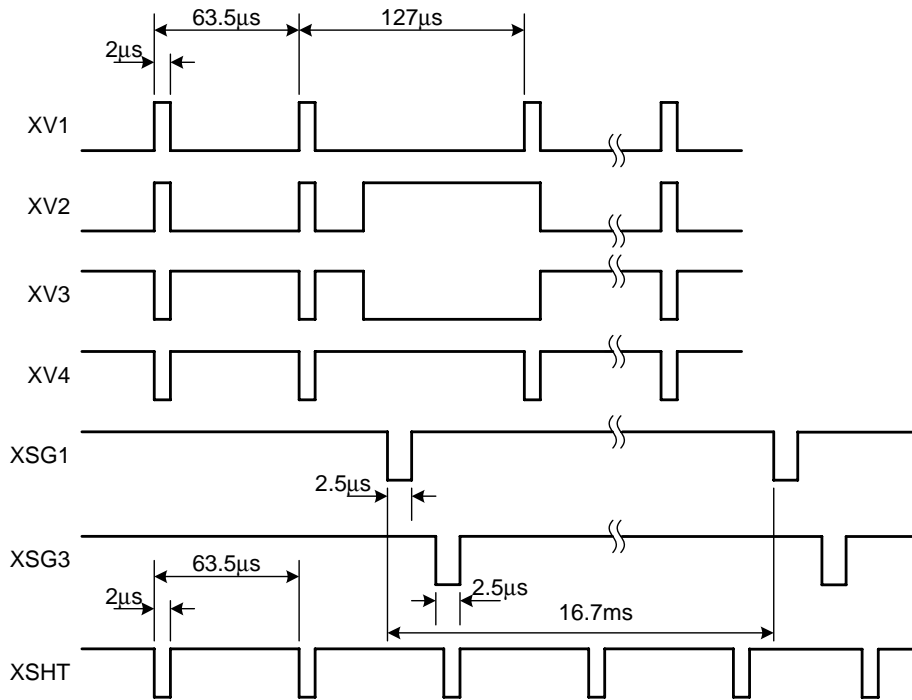
| Input | | | | Output | | |
|------------|--------------|------------|------|----------|----------|-----|
| XV1 XV3 | XSG1 XSG3 | XV2 XV4 | XSHT | V1 V3 | V2 V4 | SHT |
| L | L | X | X | VH | X | X |
| L | H | X | X | VM | X | X |
| H | L | X | X | VL | X | X |
| H | H | X | X | VL | X | X |
| X | X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

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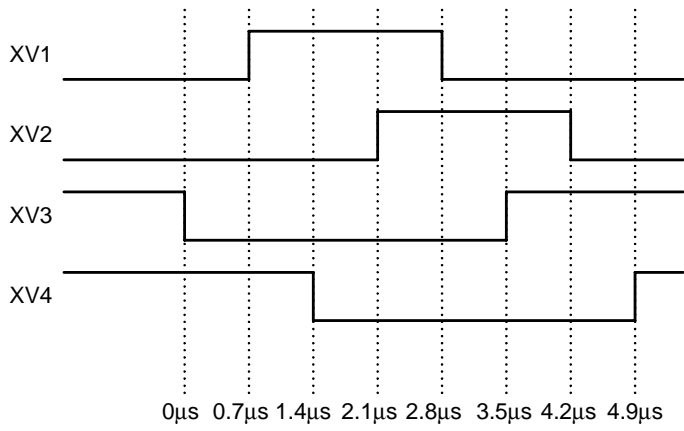
Timing Chart



CCD Equivalent Load Measurement Timing Waveform



Enlarged View of overlapped portion



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