

Version : 0.1

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Http://www.lcdfriends.com

TECHNICAL SPECIFICATION

MODEL NO. : PW084XS2

Customer's Confirmation

Customer _____

Date _____

By _____

PVI's Confirmation

Confirmed By _____

Prepared By _____

PRIME VIEW INTERNATIONAL CO.,LTD.
3,LI SHIN RD. 1,SCIENCE-BASED INDUSTRIAL
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<http://www.pvi.com.tw>

Date : Mar. 24, 2003

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TECHNICAL SPECIFICATION

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1. Application

This technical specification applies to 8.4" color TFT-LCD module, PW084XS2. The applications of the panel are car TV, portable DVD, GPS, multimedia applications and others AV system.

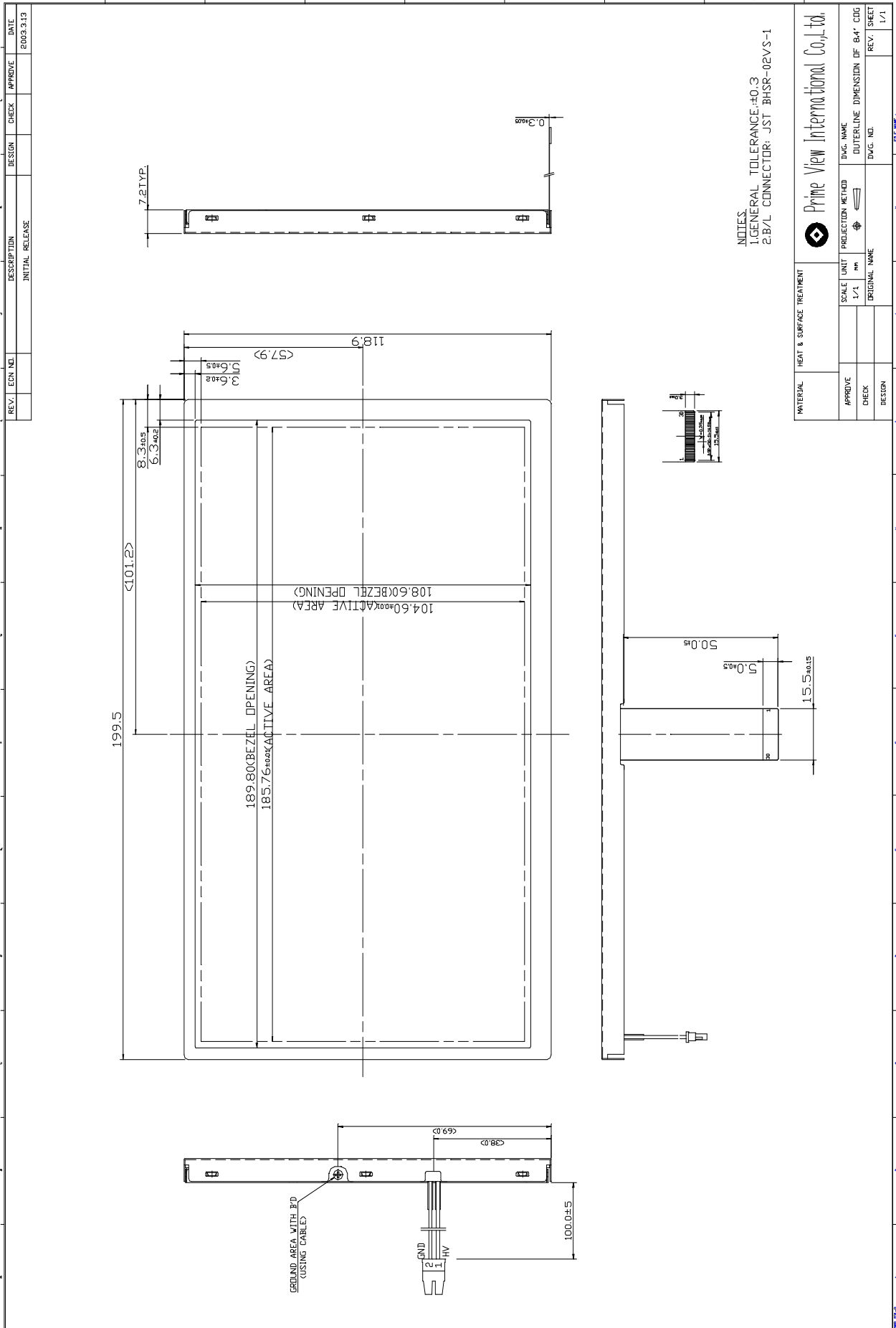
2. Features

- . Pixel in stripe configuration
- . Slim and compact
- . High Brightness
- . Image Reversion : Up/Down and Left/Right
- . Wide Viewing Angle
- . Support multi display mode
(If you use this mode, you must use PVI-1004B's timing controller (mode by PVI))

3. Mechanical Specifications

| Parameter | Specifications | Unit |
|---------------------|----------------------------------|------|
| Screen Size | 8.4 (16:9 diagonal) | Inch |
| Display Format | 1440 (H) ×234(V) | dot |
| Active Area | 185.76 (H)×104.60 (V) | mm |
| Dot Pitch | 0.129(H)×0.447(V) | mm |
| Pixel Configuration | Stripe | |
| Outline Dimension | 199.5(W)× 118.9(H)× 7.2(D)(typ.) | mm |
| Surface Treatment | Anti-Glare | |
| Weight | TBD | g |

4.Mechanical Drawing of TFT-LCD Module



| | | | |
|----------|----------|----------------------------|------------------------------------|
| MATERIAL | | HEAT & SURFACE TREATMENT | |
| APPROVE | SCALE | UNIT | PROJECTION METHOD |
| CHECK | 1/1 | mm | 1st Angle |
| DESIGN | DESIGNER | ORIGINAL NAME | DWG. NO. |
| | | | PRIME VIEW INTERNATIONAL CO., LTD. |
| | | OUTERLINE DIMENSION OF B/L | CDG |
| | | REV. | SHEET |
| | | 1/1 | 1/1 |

5. Input / Output Terminals

LCD Module Connector

FPC Down Connect , 30 Pins , Pitch : 0.5 mm

| Pin No | Symbol | I/O | Description | Remark |
|--------|------------------|-----|---|----------|
| 1 | GND | - | Ground for logic circuit | |
| 2 | V _{CC} | I | Supply voltage of logic control circuit for gate driver | Note 5-3 |
| 3 | NC | - | No connection | |
| 4 | V _{EE} | I | Negative power gate driver | Note 5-4 |
| 5 | NC | - | No connection | |
| 6 | V _{GH} | I | Positive power for gate driver | Note 5-5 |
| 7 | NC | - | No connection | |
| 8 | STVD | I/O | Vertical start pulse | Note 5-1 |
| 9 | STVU | I/O | Vertical start pulse | |
| 10 | CKV | I | Shift clock for gate driver | |
| 11 | U/D | I | Up / Down Control for gate driver | Note 5-1 |
| 12 | OE3 | I | Output enable for gate driver | |
| 13 | OE2 | I | Output enable for gate driver | |
| 14 | OE1 | I | Output enable for gate driver | |
| 15 | V _{COM} | I | Common electrode voltage | |
| 16 | STHL | I/O | Start pulse for source driver | Note 5-2 |
| 17 | V _{SS2} | - | Ground for analog circuit | |
| 18 | V _R | I | Video Input R | |
| 19 | V _G | I | Video Input G | |
| 20 | V _B | I | Video Input B | |
| 21 | V _{SS1} | - | Ground for digital circuit | |
| 22 | V _{DD2} | I | Supply power for analog circuit | Note 5-6 |
| 23 | CPH1 | I | Sampling and shift clock for source driver | |
| 24 | CPH2 | I | Sampling and shift clock for source driver | |
| 25 | CPH3 | I | Sampling and shift clock for source driver | |
| 26 | V _{DD1} | I | Supply power for digital circuit | Note 5-7 |
| 27 | R/L | I | Left / Right Control for source driver | Note 5-2 |
| 28 | NC | I | No Connection | |
| 29 | OEH | I | Output enable for source driver | |
| 30 | STHR | I/O | Start pulse for source driver | Note 5-2 |

Note 5-1

| | | | |
|-----------------|--------|--------|--------------------|
| U/D | STVD | STVU | scanning direction |
| V _{cc} | Input | output | down to up |
| GND | Output | input | up to down |

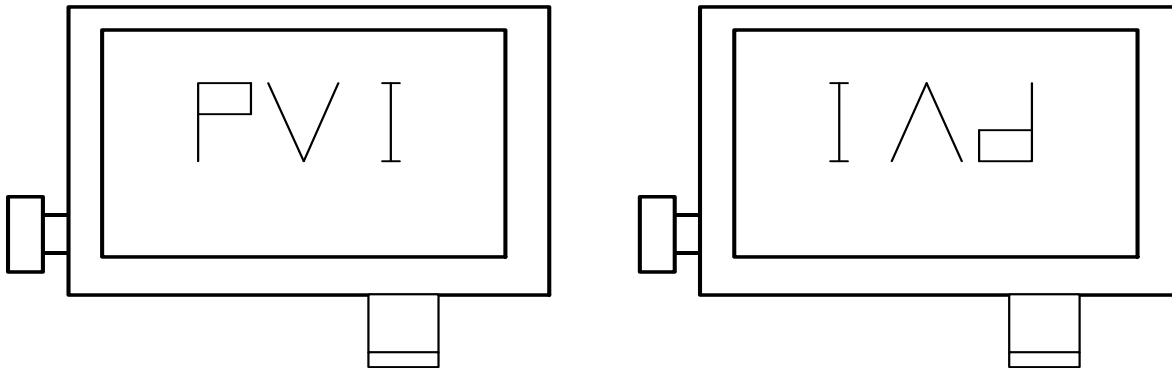
Note 5-2

| | | | |
|-----------------|--------|--------|--------------------|
| R/L | STHL | STHR | scanning direction |
| V _{cc} | output | input | left to right |
| GND | input | output | right to left |

The definitions of Note 5-1,5-2

U/D(FIN 11)=Low R/L(FIN 27)=High

U/D(FIN 11)=High R/L(FIN 27)=Low



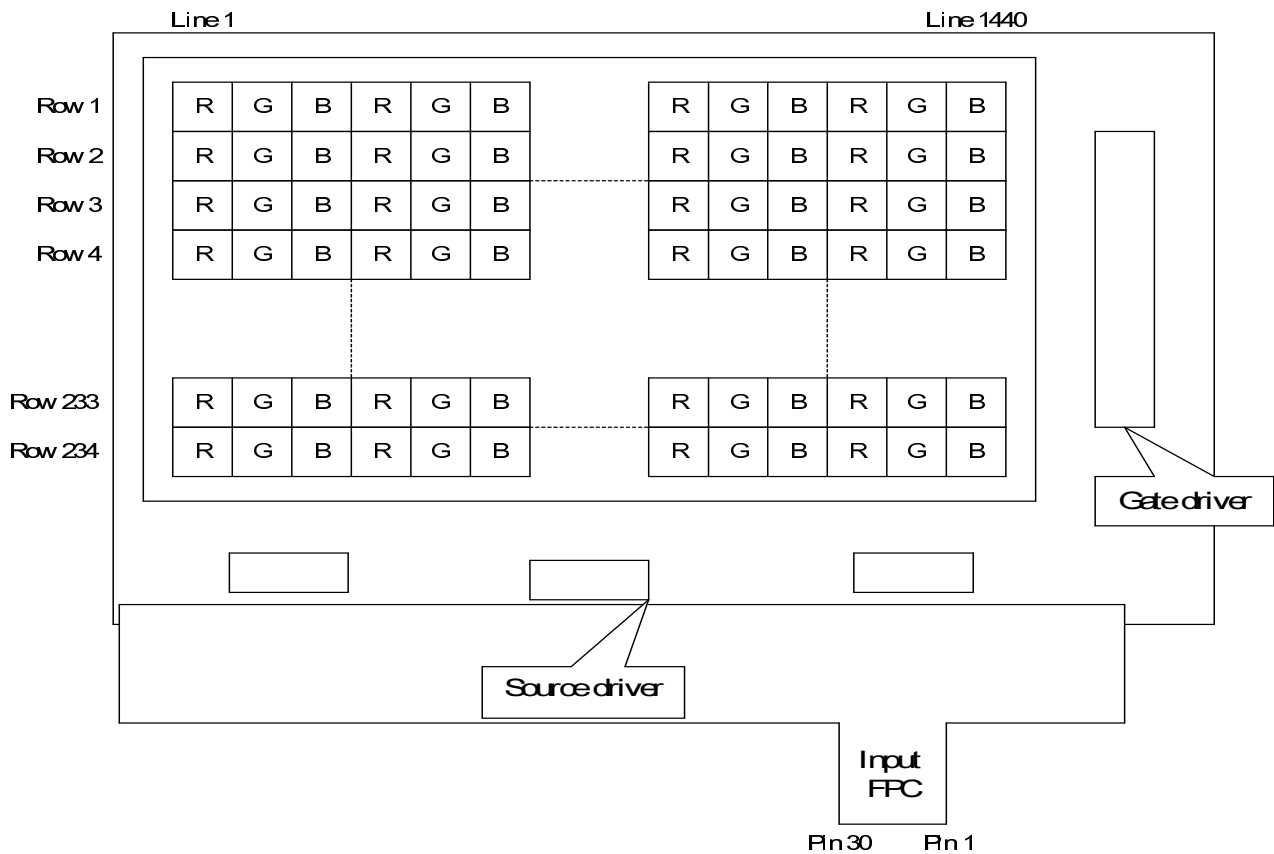
Note 5-3 : V_{CC} TYP. = +5V

Note 5-4 : V_{EE} TYP. = -12V

Note 5-5 : V_{GH} TYP. = +17V

Note 5-6 : V_{DD2} TYP. = +5V

Note 5-7 : V_{DD1} TYP. = +5V



6. Pixel Arrangement and input connector pin NO.

7. Absolute Maximum Ratings

The followings are maximum values , which if exceeded, may cause faulty operation or damage to the unit.

| Parameter | Symbol | MIN. | MAX. | Unit | Remark |
|----------------------------------|------------------|------|---------------|------|----------|
| Supply Voltage For Source Driver | V_{DD2} | -0.3 | +5.8 | V | |
| | V_{DD1} | -0.3 | +7.0 | V | |
| Supply Voltage For Gate Driver | V_{CC} | -0.3 | +6.0 | V | |
| | $V_{GH}-V_{EE}$ | -0.3 | +40.0 | V | |
| | H Level V_{GH} | -0.3 | +25.0 | V | |
| | L Level V_{EE} | -16 | +0.3 | V | |
| Analog Signal Input Level | V_R, V_G, V_B | -0.2 | $V_{DD1}+0.2$ | V | Note 7-1 |
| Storage Temperature | | -30 | +80 | °C | |
| Operation Temperature | | -20 | +80 | °C | Note 7-2 |

Notes 7-1 : Analog Input Voltage means V_R, V_G, V_B .

Notes 7-2 : Optical characteristics shown in Table 10-1 are measured under $T_a=+25^{\circ}\text{C}$.

8. Electrical Characteristics

8-1) Recommended Driving condition for TFT-LCD panel

| Parameter | | Symbol | MIN. | Typ. | MAX. | Unit | Remark |
|----------------------------------|----------|---------------|---------------|------|---------------|-----------|------------------------------------|
| Supply Voltage For Source Driver | Analog | V_{DD2} | +4.5 | +5.0 | +5.5 | V | |
| | Logic | V_{DD1} | +4.5 | +5.0 | +5.5 | V | |
| Supply Voltage For Gate Driver | H level | V_{GH} | +15 | +17 | +19 | V | |
| | L level | $V_{EE\ DC}$ | -13.0 | -12 | -10.5 | V | DC Component of V_{EE} |
| | | $V_{EE\ AC}$ | | +6.0 | | V_{P-P} | AC Component of V_{EE} |
| | Logic | V_{CC} | +4.5 | +5.0 | +5.5 | V | |
| Analog Signal input Level | Amplitud | | +0.3 | | $V_{CC}-0.3$ | V | |
| Digital input voltage | H level | V_{IH} | $0.7 V_{DD1}$ | - | V_{DD1} | V | |
| | L level | V_{IL} | -0.3 | - | $0.3 V_{DD1}$ | V | |
| Digital output voltage | H level | V_{OH} | $0.7 V_{DD1}$ | - | V_{DD1} | V | |
| | L level | V_{OL} | -0.3 | - | $0.3 V_{DD1}$ | V | |
| V_{COM} | | $V_{COM\ AC}$ | - | +6.0 | - | V_{P-P} | AC Component of V_{COM} |
| | | $V_{COM\ DC}$ | 1.3 | 1.5 | 1.7 | V | DC Component of V_{COM} Note 8-1 |

Note 8-1 : PVI strongly suggests that the $V_{COM\ DC}$ level shall be adjustable , and the adjustable level range is $1.5V\pm 1V$, every module's $V_{COM\ DC}$ level shall be carefully adjusted to show a best image performance.

8-2) Back Light driving (JST BHSR-02VS-1 ,Pin No. : 2)

| Pin No | Symbol | Description | Remark |
|--------|--------|-----------------------------------|----------------------------|
| 1 | VL1 | Input terminal (Hi voltage side) | Wire color: pink |
| 2 | VL2 | Input terminal (Low voltage side) | Wire color: white Note 8-1 |

Note 8-1 : Low voltage side of back light inverter connects with Ground of inverter circuits.

Recommended driving condition for back light

Ta= 25 °C

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|--------|------|------|------|------|----------|
| Lamp voltage | V_L | TBD | TBD | TBD | Vrms | |
| Lamp current | I_L | TBD | TBD | TBD | mA | Note 8-2 |
| Lamp frequency | P_L | TBD | TBD | TBD | KHz | Note 8-3 |
| Starting voltage(25°C) (Reference Value) | V_s | | | TBD | Vrms | Note 8-4 |
| Starting voltage(0°C) (Reference Value) | V_s | | | TBD | Vrms | Note 8-4 |

Note 8-2 : In order to satisfy the quality of B/L , no matter use what kind of inverter , the output lamp current must between Min. and Max. to avoid the abnormal display image caused by B/L.

Note 8-3 : The waveform of lamp driving voltage should be as closed to a perfect sine wave as possible.

Note 8-4 : This value is not output voltage of inverter.
The voltage of inverter must larger than the starting voltage.

8-3) Power Consumption

Ta= 25 °C

| Parameter | Symbol | Conditions | TYP. | MAX | Unit | Remark |
|--|-----------|-----------------|------|-----|------|----------|
| Supply current for Gate Driver (Hi level) | I_{GH} | $V_{GH} = +17V$ | TBD | TBD | mA | |
| Supply current for Gate Driver (Low level) | I_{EE} | $V_{EE} = -12V$ | TBD | TBD | mA | |
| Supply current for Source Driver(Digital) | I_{DD1} | $V_{DD1} = +5V$ | TBD | TBD | mA | |
| Supply current for Source Driver(Analog) | I_{DD2} | $V_{DD2} = +5V$ | TBD | TBD | mA | |
| Supply current for Gate Driver (Digital) | I_{CC} | $V_{CC} = +5V$ | TBD | TBD | mA | |
| LCD Panel Power Consumption | | | TBD | | mW | Note 8-5 |
| Back Light Lamp Power Consumption | | | TBD | | W | Note 8-6 |

Note 8-5: The power consumption for back light is not included.

Note 8-6: Back light lamp power consumption is calculated by $I_L \times V_L$.

8-4) Timing Characteristics Of Input Signals

| Characteristics | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---------------------------------|------------|------|-------|------|-------------|-----------|
| Rising time | t_r | - | - | 10 | ns | |
| Falling time | t_f | - | - | 10 | ns | |
| High and low level pulse width | t_{CPH} | 9.2 | 9.6 | 10.0 | MHz | CPH1~CPH3 |
| CPH pulse duty | t_{CWH} | 30 | 50 | 70 | % | CPH1~CPH3 |
| STH setup time | t_{SUH} | 20 | - | - | ns | STHR,STHL |
| STH hold time | t_{HDH} | 20 | - | - | ns | STHR,STHL |
| STH pulse width | t_{STH} | - | 1 | - | t_{CPH} | STHR,STHL |
| STH period | t_H | 61.5 | 63.5 | 65.5 | μs | STHR,STHL |
| OEH pulse width | t_{OEH} | - | 1.40 | - | μs | OEH |
| Sample and hold disable time | t_{DIS1} | - | 7.43 | - | μs | |
| OEV pulse width | t_{OEV} | - | 18 | - | μs | OEV |
| CKV pulse width | t_{CKV} | - | 31.75 | - | μs | CKV |
| Clean enable time | t_{DIS2} | - | 9.0 | - | μs | |
| Horizontal display start | t_{SH} | - | 0 | - | $t_{CPH}/3$ | |
| Horizontal display timing range | t_{DH} | - | 480 | - | t_{CPH} | |
| STV setup time | t_{SUV} | 400 | - | - | Ns | STVR,STVL |
| STV hold time | t_{HDV} | 400 | - | - | Ns | STVR,STVL |
| STV pulse width | t_{STV} | - | - | 1 | t_H | STVR,STVL |
| Horizontal lines per field | t_V | 256 | 262 | 268 | t_H | |
| Vertical display start | t_{SV} | | 3 | - | t_H | |
| Vertical display timing range | t_{DV} | | 234 | - | t_H | |
| VCOM rising time | t_{rCOM} | | - | 5 | Ms | |
| VCOM falling time | t_{fCOM} | | - | 5 | Ms | |
| VCOM delay time | t_{DCOM} | | - | 3 | Ms | |
| RGB delay time | t_{DRGB} | | - | 1 | Ms | |

8-5) Signal Timing Waveforms

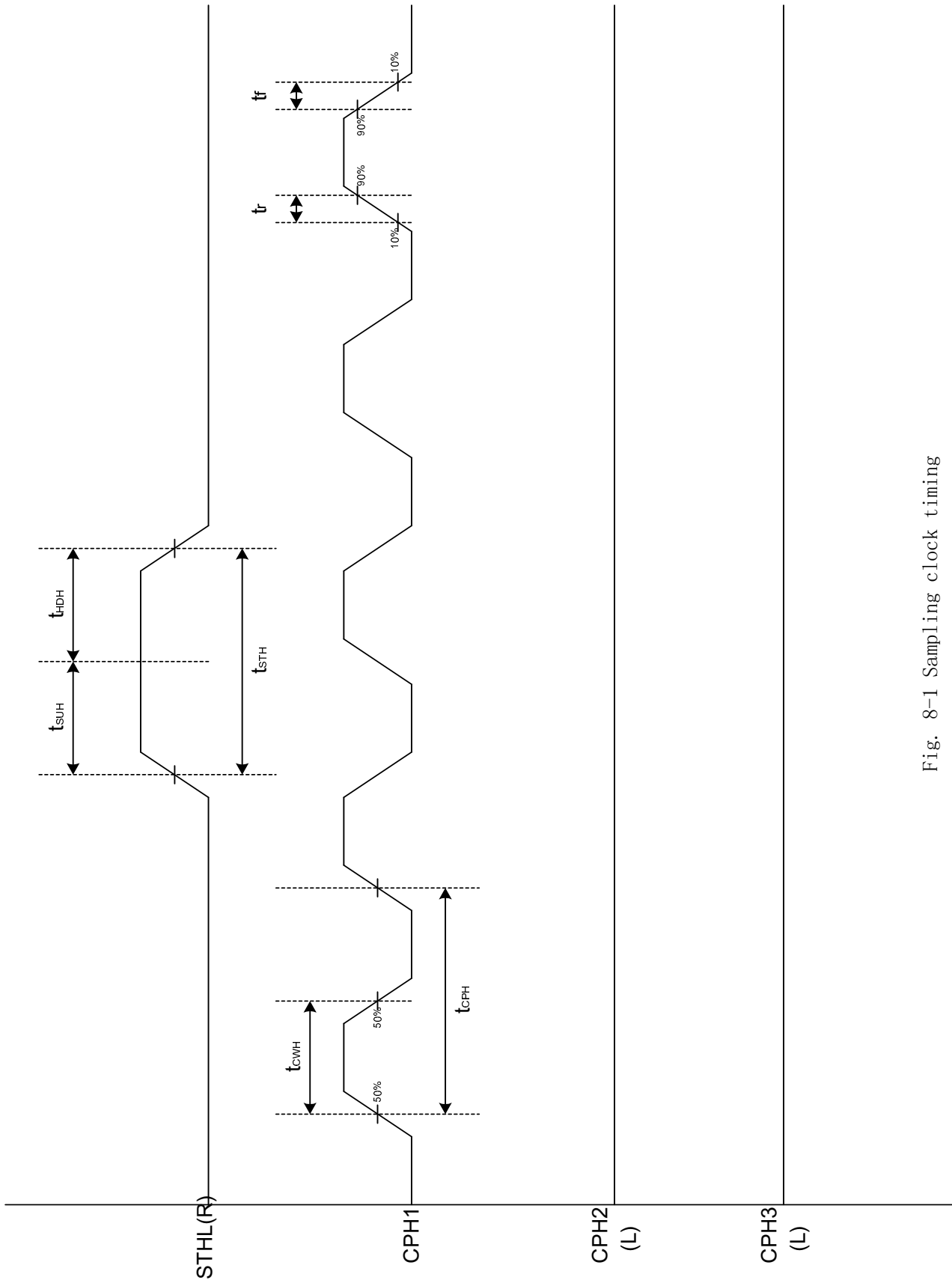


Fig. 8-1 Sampling clock timing

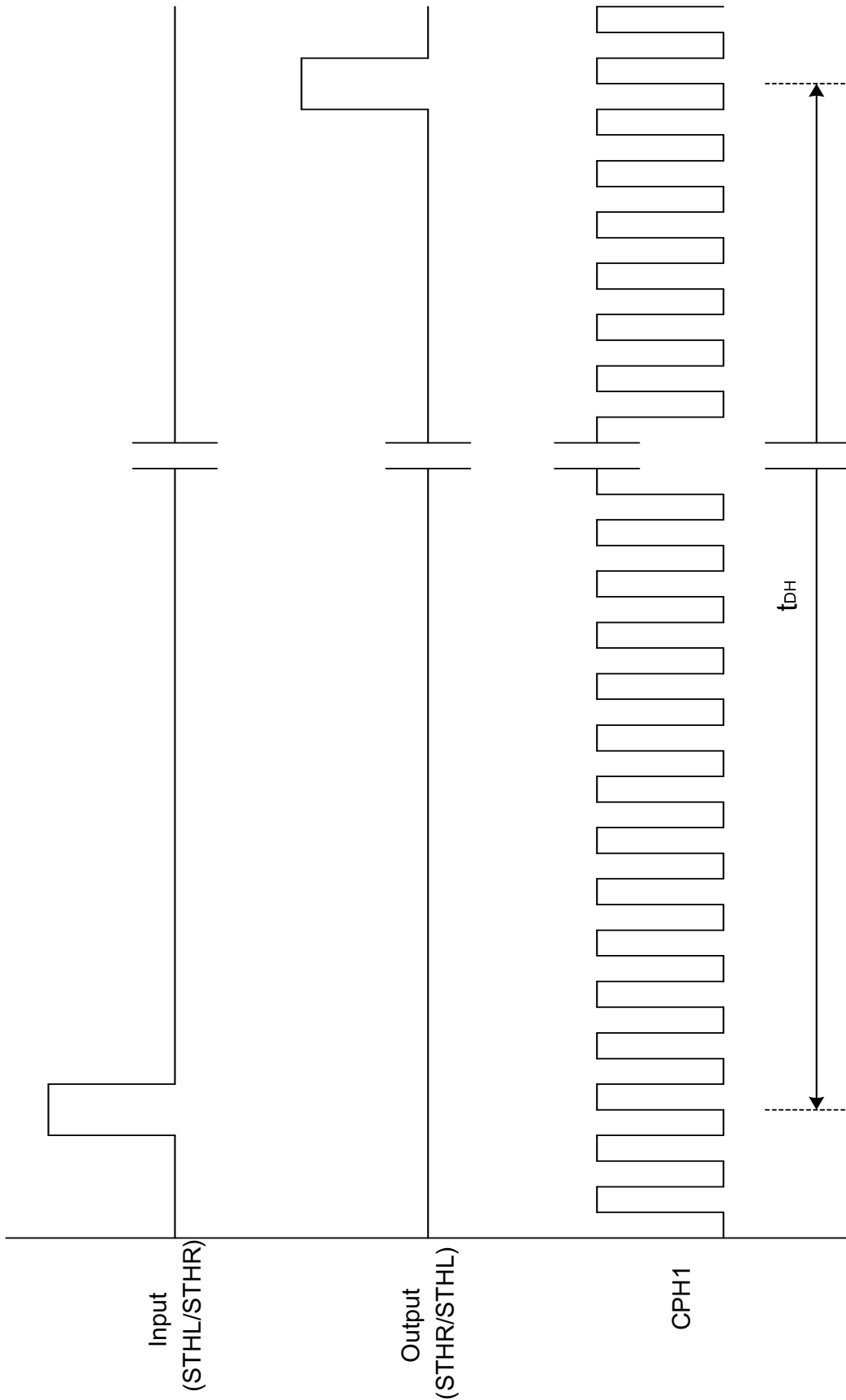


Fig. 8-2 Horizontal display timing range

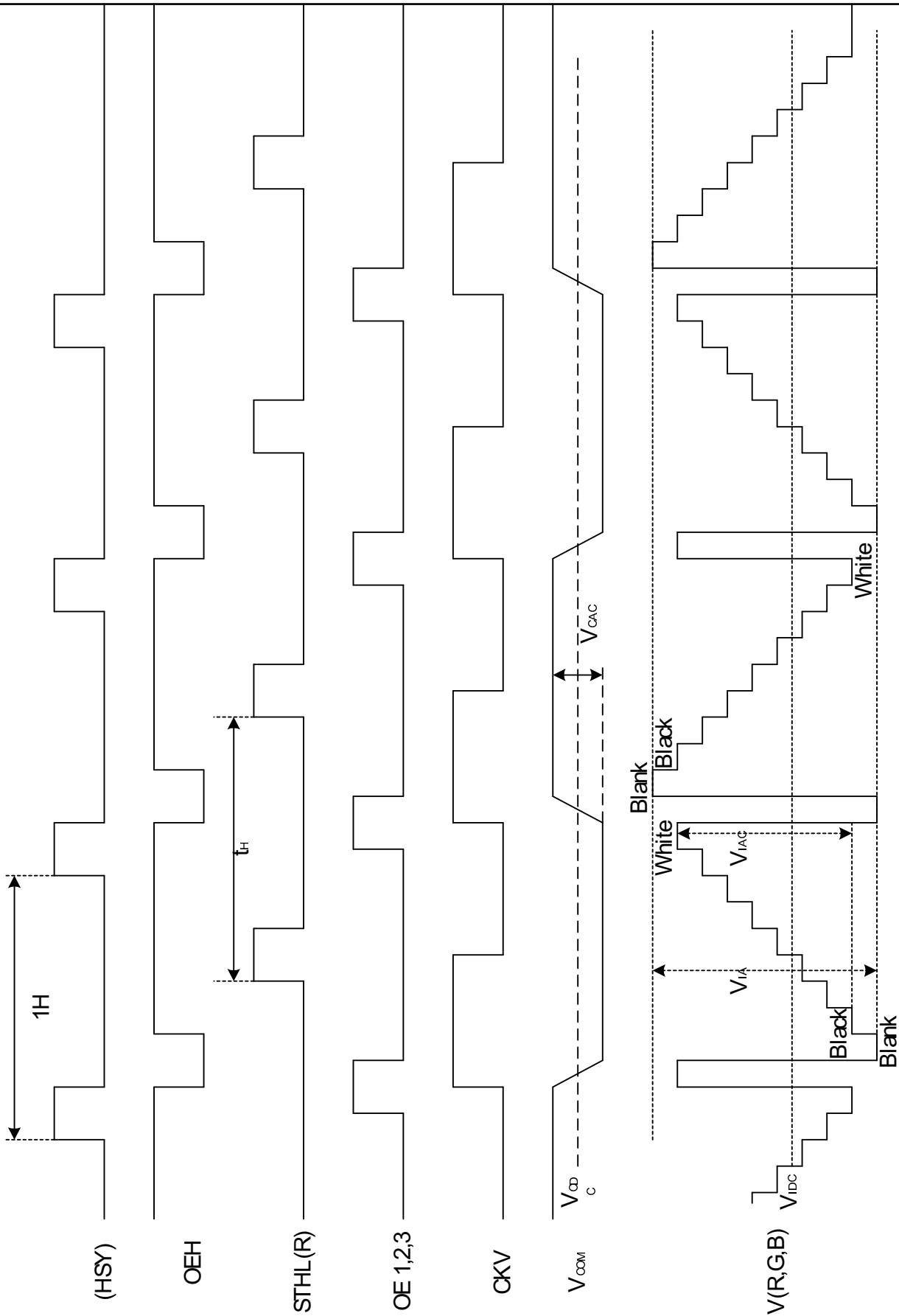
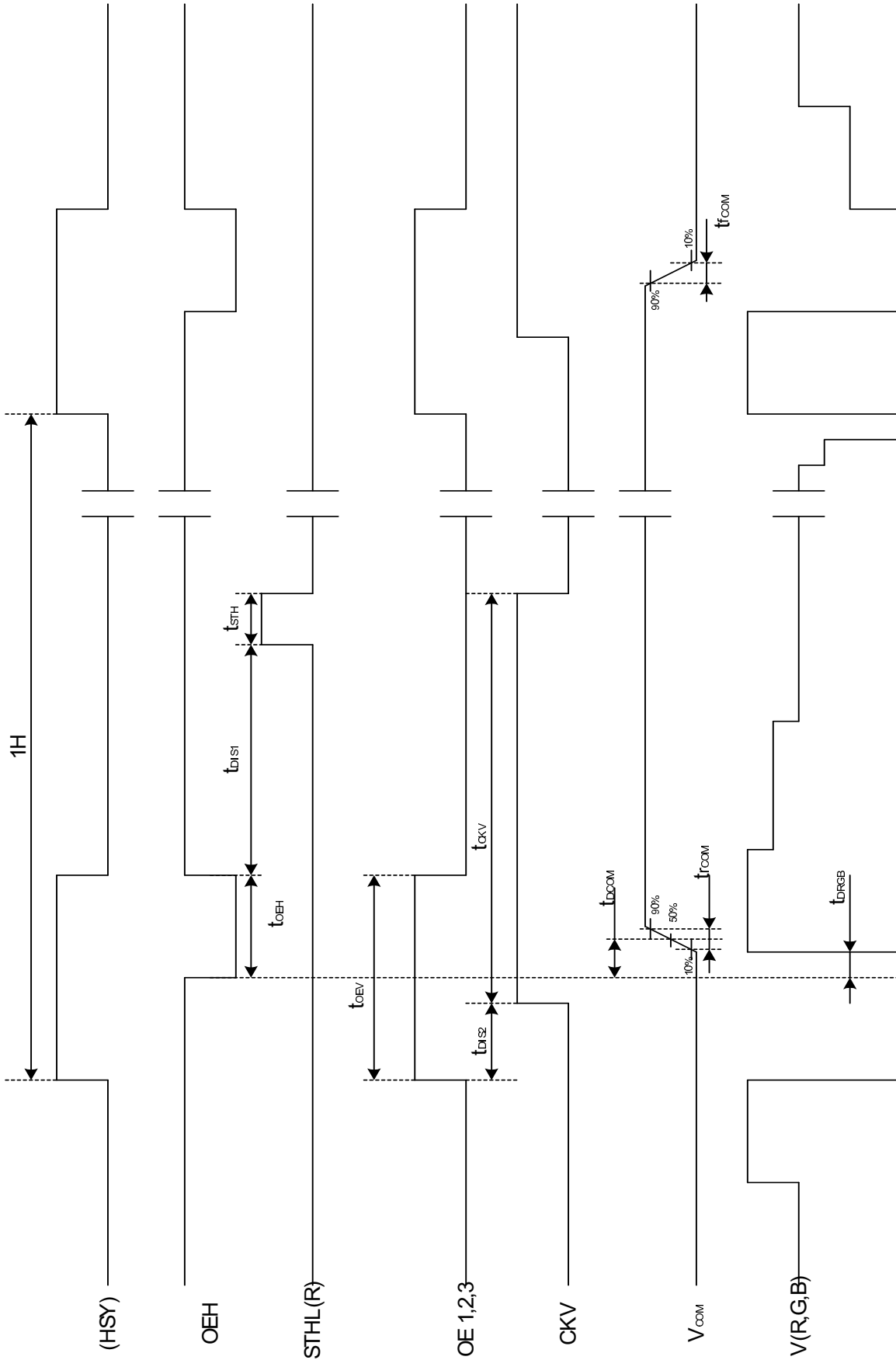


Fig. 8-3 (a) Horizontal timing



Note : The falling edge of OEV should be synchronized with the falling edge of OEH

Fig. 8-3 (b) Detail horizontal timing

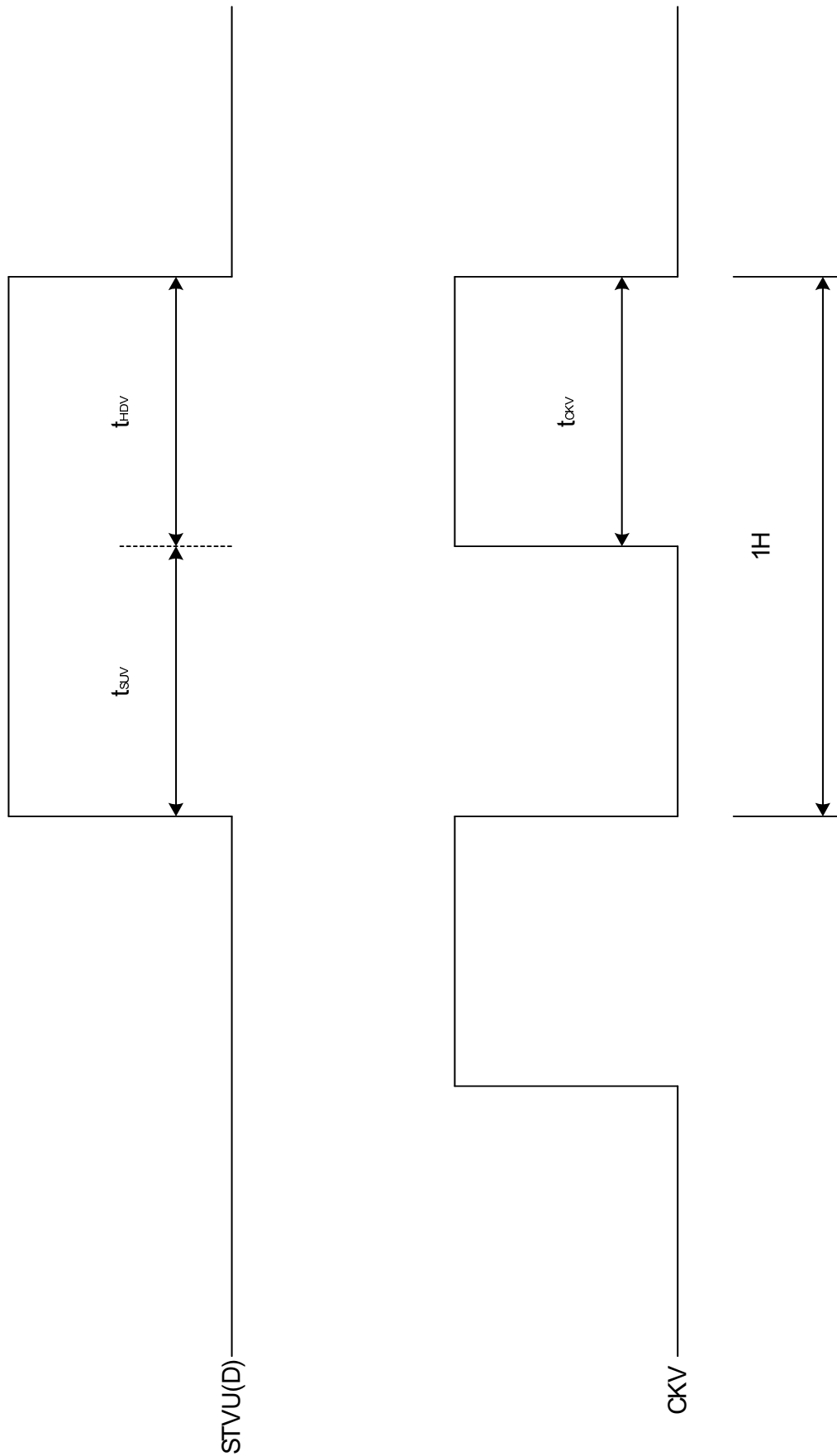


Fig. 8-4 Vertical shift clock timing

Vertical timing (From up to down)

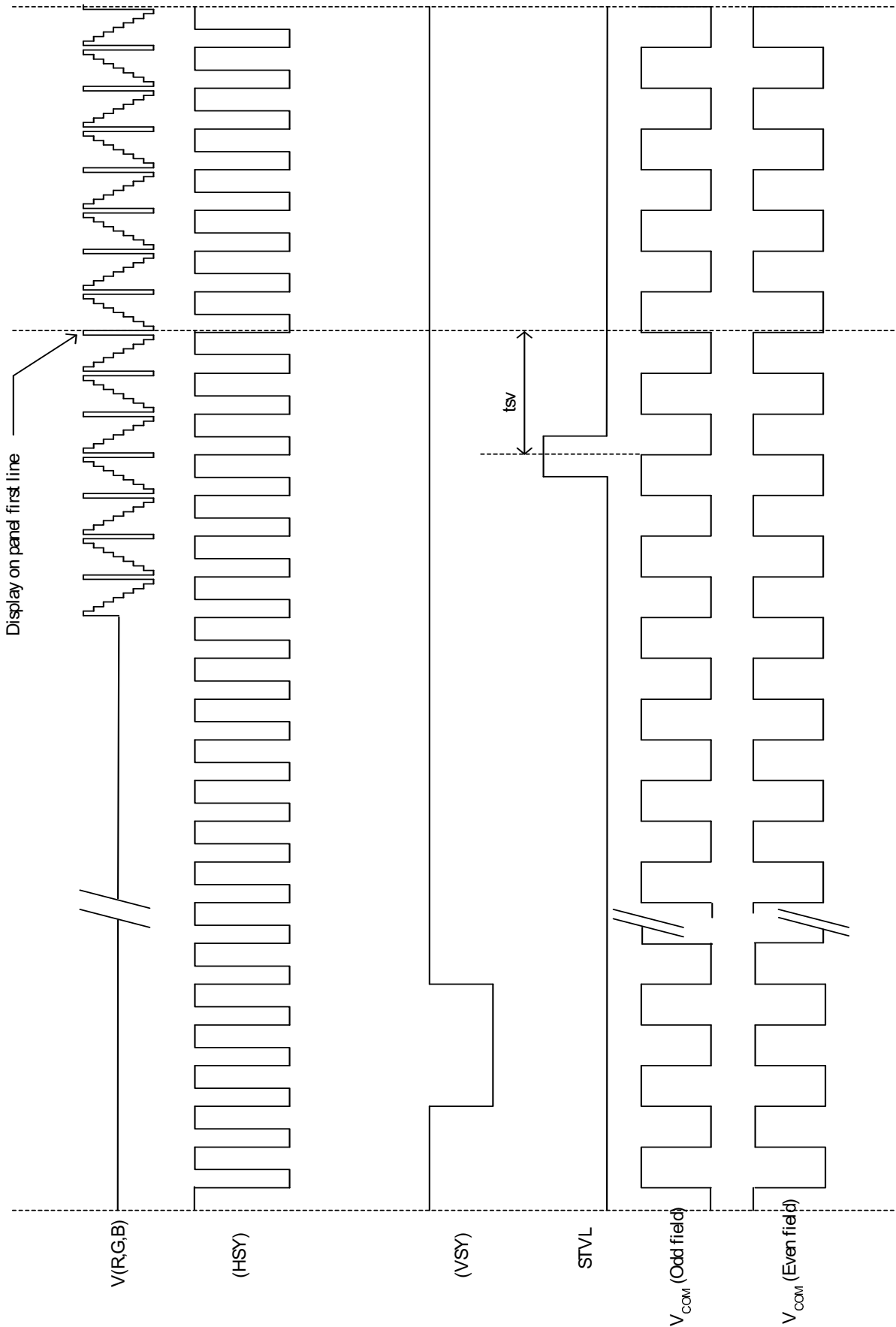


Fig. 8-5 (a) Vertical timing (From Up to Down)

Vertical timing (From down to up)

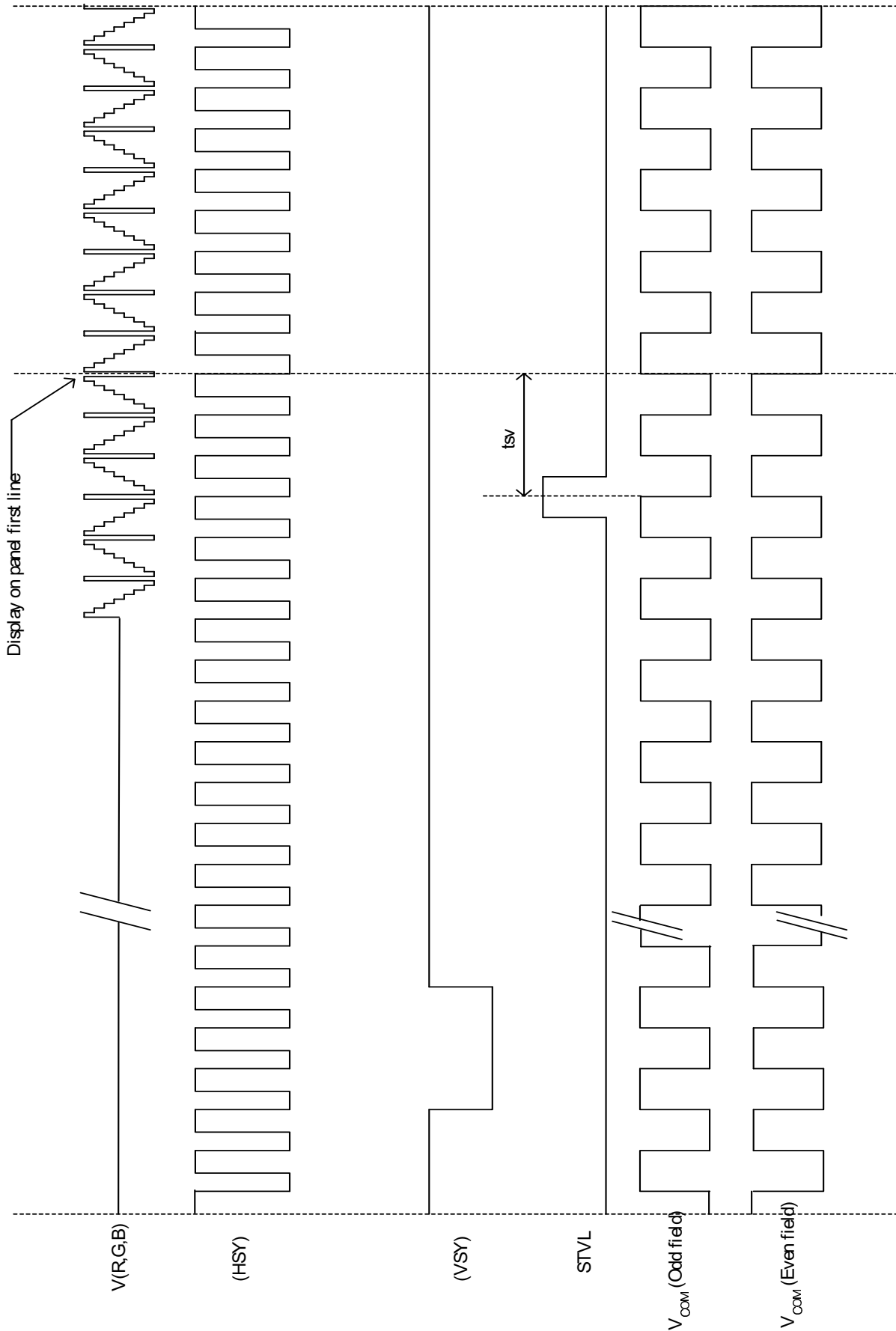
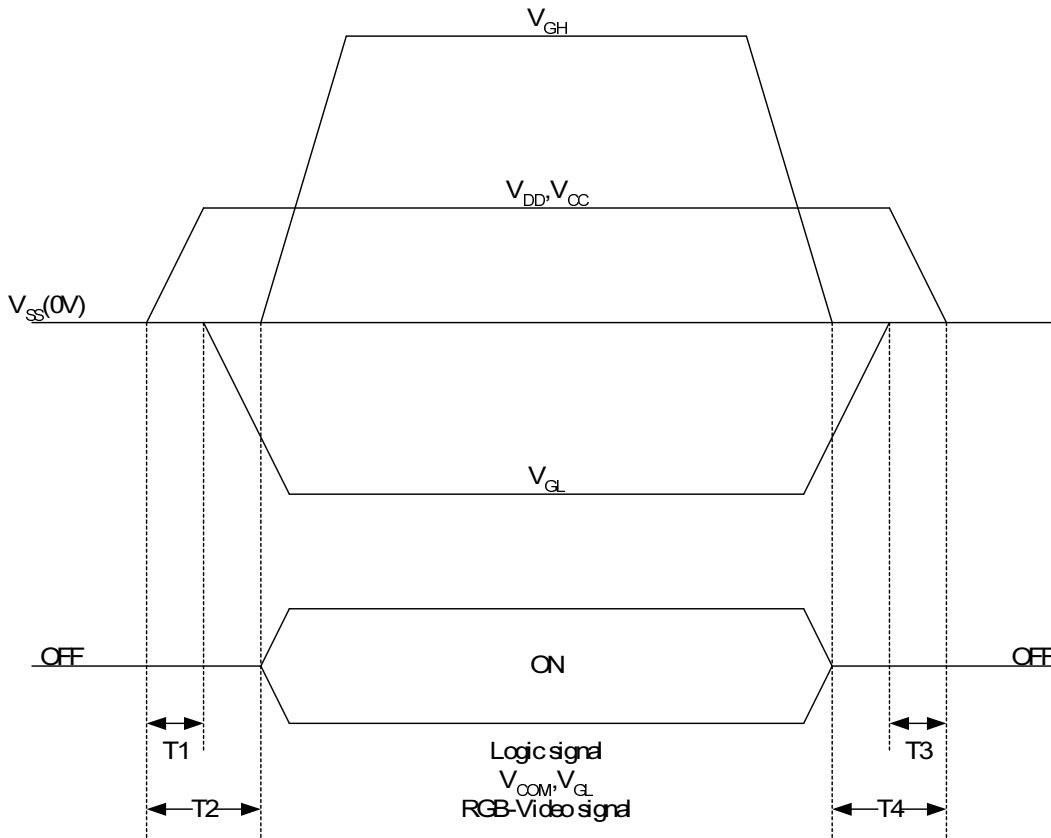


Fig. 8-5 (b) Vertical timing (From Down to Up)

9. Power on Sequence

The Power on Sequence only effect by V_{CC} , V_{DD} , V_{GL} and V_{GH} , the others do not care.



- 1) $10ms \leq T1 < T2$
- 2) $0ms < T3 \leq T4 \leq 10ms$

10. Optical Characteristics

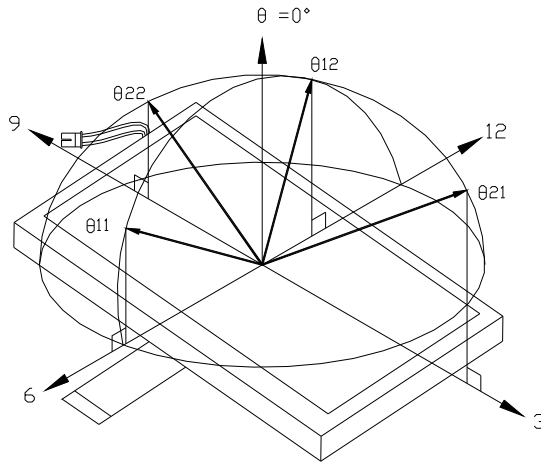
10-1) Specification

$T_a = 25^\circ C$

| Parameter | Symbol | Condition | MIN. | TYP. | MAX. | Unit | Remarks |
|--------------------|------------|----------------------------|------|------|------|-------------------|-----------|
| Viewing Angle | Horizontal | θ_{21}, θ_{22} | 45 | 55 | | deg | Note 10-1 |
| | Vertical | θ_{12} | 10 | 15 | | deg | |
| | | θ_{11} | 30 | 35 | | deg | |
| Contrast Ratio | CR | At optimized Viewing angle | 110 | 150 | | | Note 10-2 |
| Response time | Rise | T_r | | 15 | 30 | ms | Note 10-4 |
| | Fall | T_f | | 25 | 50 | ms | |
| Brightness | | | 350 | 400 | | cd/m ² | Note 10-3 |
| Transmission Ratio | T | | TBD | TBD | | % | |
| Uniformity | U | | TBD | TBD | | % | Note 10-5 |
| White Chromaticity | x | $\theta = 0^\circ$ | TBD | TBD | TBD | | Note 10-3 |
| | y | | TBD | TBD | TBD | | |

| | | | | | | | |
|----------------------|----|--|-----|-----|-----|----|--|
| | Tc | | TBD | TBD | TBD | K | |
| Lamp Life Time +25°C | | | | TBD | | hr | |

Note 10-1 : The definitions of viewing angles

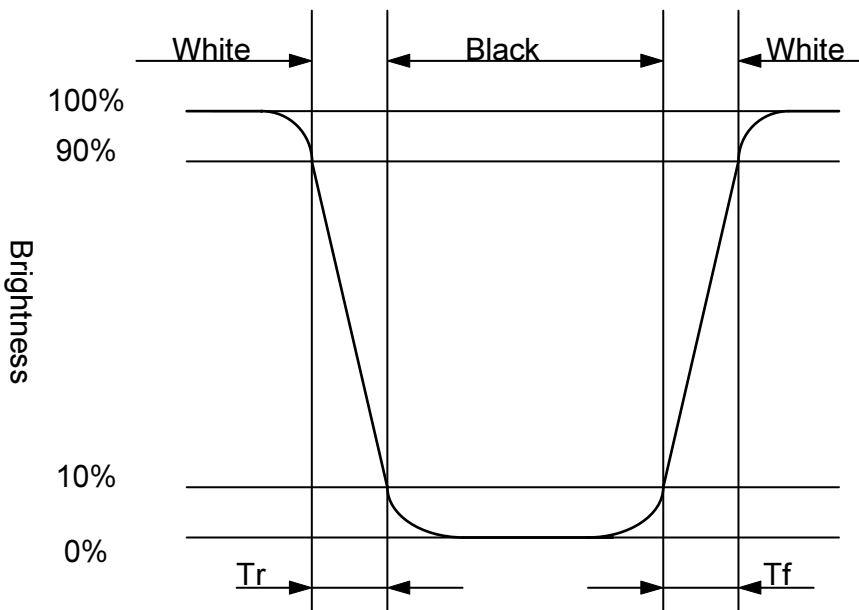


Note 10-2 : $CR = \frac{\text{Luminance when Testing point is White}}{\text{Luminance when Testing point is Black}}$
 (Testing configuration see 8-2)

Contrast Ratio is measured in optimum common electrode voltage.

Note 10-3 : Topcon BM-7(fast) luminance meter 2° field of view is used in the testing (after 20~30 minutes operation).
 Lamp Current 6mA

Note 10-4 : The definition of response time:



Note 10-5 : The uniformity of LCD is defined as

$$U = \frac{\text{The Minimum Brightness of the 9 testing Points}}{\text{The Maximum Brightness of the 9 testing Points}}$$

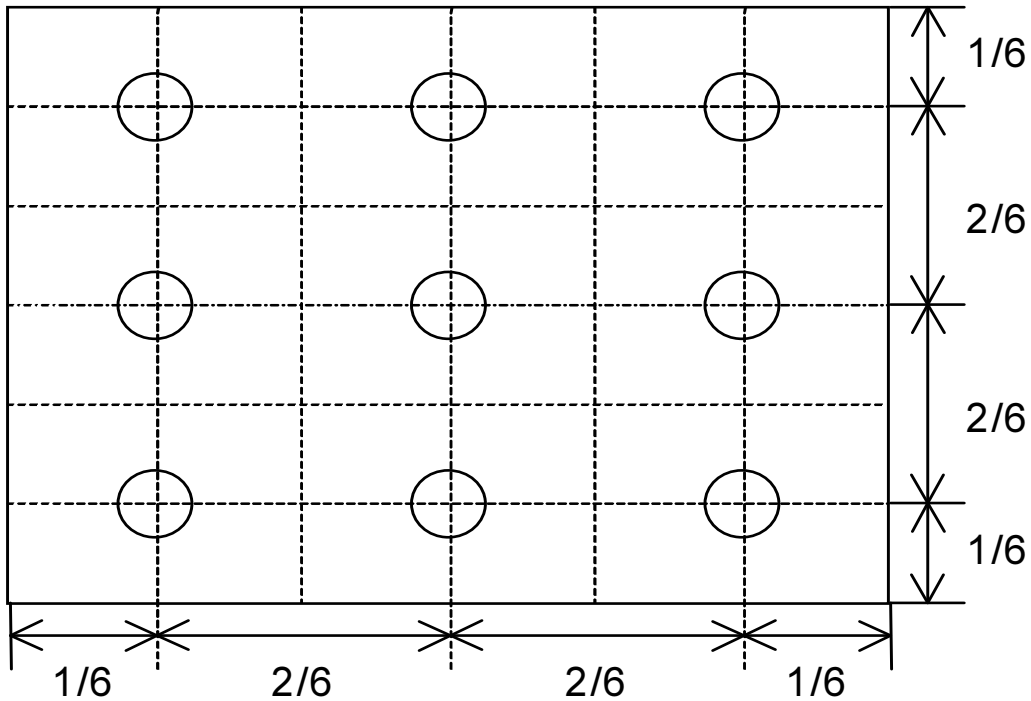
Luminance meter : BM-5A or BM-7 fast (TOPCON)

Measurement distance : 500 mm +/- 50 mm

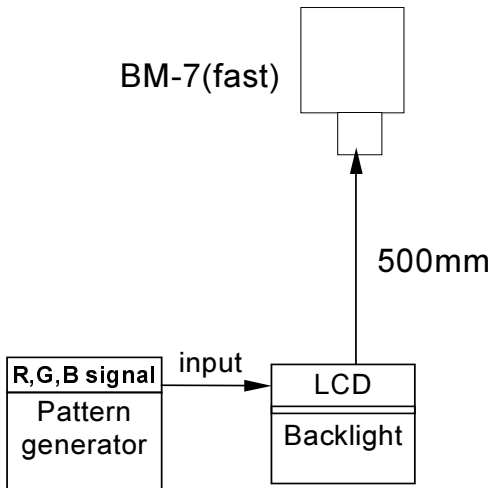
Ambient illumination : < 1 Lux

Measuring direction : Perpendicular to the surface of module

The test pattern is white (Gray Level 63).

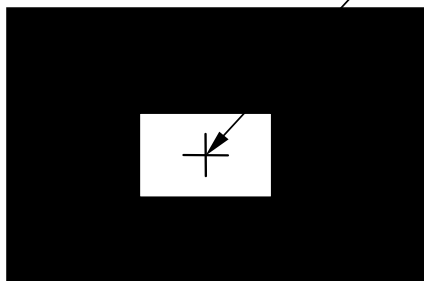


10-2) Testing configuration

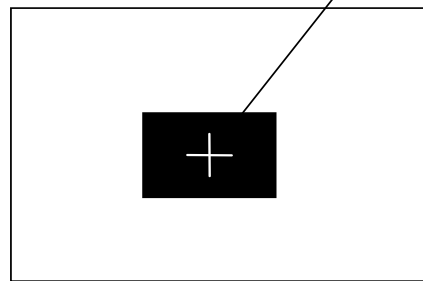


Caution: 1. Environmental illumination ≤ 1 lux
 2. Before test CR, Vcom voltage must be adjusted carefully to get the best CR.

- LCD Display Testing Point Testing Point

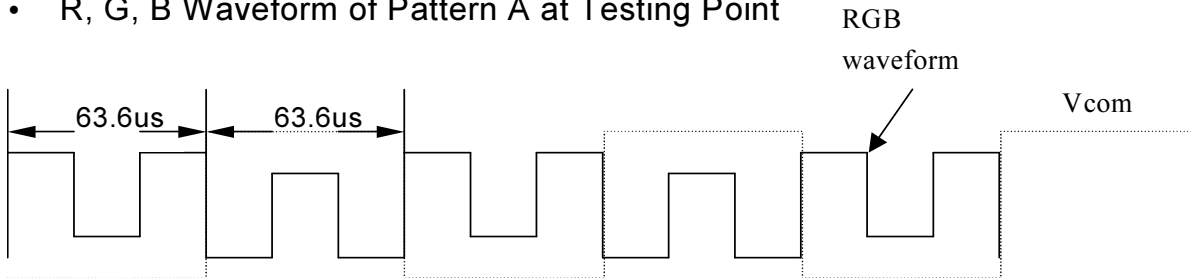


Pattern A

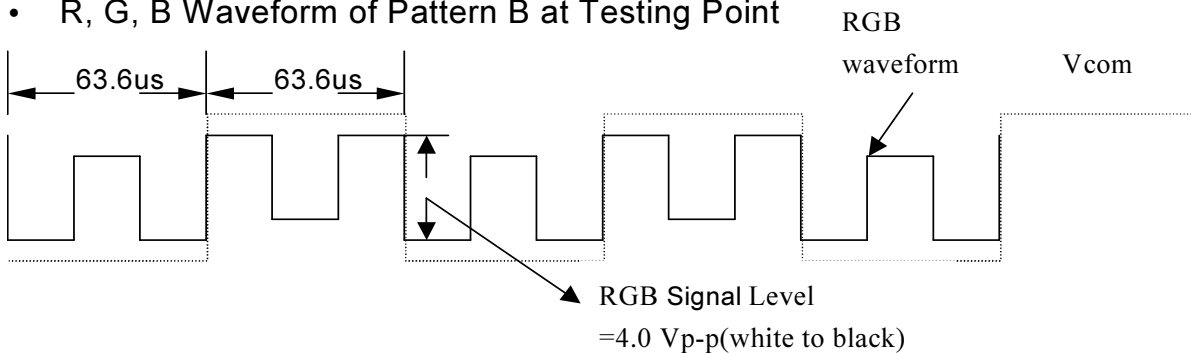


Pattern B

- R, G, B Waveform of Pattern A at Testing Point



- R, G, B Waveform of Pattern B at Testing Point



11. Handling Cautions

11-1) Mounting of module

a) Please power off the module when you connect the input/output connector.

0. Please connect the ground pattern of the inverter circuit surely. If the connection is not perfect, some following problems may happen possibly.

0. The noise from the backlight unit will increase.

2. The output from inverter circuit will be unstable.

0. In some cases a part of module will heat.

0. Polarizer which is made of soft material and susceptible to flaw must be handled carefully.

d) Protective film (Laminator) is applied on surface to protect it against scratches and dirt. It is recommended to peel off the laminator before use and taking care of static electricity.

11-2) Precautions in mounting

a) When metal part of the TFT-LCD module (shielding lid and rear case) is soiled, wipe it with soft dry cloth.

0. Wipe off water drops or finger grease immediately. Long contact with water may cause discoloration or spots.

0. TFT-LCD module uses glass which breaks or cracks easily if dropped or bumped on hard surface. Please handle with care.

d) Since CMOS LSI is used in the module. So take care of static electricity and earth yourself when handling.

11-3) Others

a) Do not expose the module to direct sunlight or intensive ultraviolet rays for many hours.

b) Store the module at a room temperature place.

0. The voltage of beginning electric discharge may over the normal voltage because of leakage current from approach conductor by to draw lump read lead line around.

d) If LCD panel breaks, it is possibly that the liquid crystal escapes from the panel. Avoid putting it into eyes or mouth. When liquid crystal sticks on hands, clothes or feet. Wash it out immediately with soap.

e) Observe all other precautionary requirements in handling general electronic components.

12. Reliability Test

| No | Test Item | Test Condition |
|----|---|--|
| 1 | High Temperature Storage Test | Ta = +80°C, 240 hrs |
| 2 | Low Temperature Storage Test | Ta = -30°C, 240 hrs |
| 3 | High Temperature Operation Test | Ta = +70°C, 240 hrs |
| 4 | Low Temperature Operation Test | Ta = -20°C, 240 hrs |
| 5 | High Temperature & High Humidity Operation Test | Ta = +60°C, 90%RH, 240 hrs |
| 6 | Thermal Cycling Test (non-operating) | -30°C→ +25°C→ +80°C, 200 Cycles 30 min 5min 30 min |
| 7 | Vibration Test (non-operating) | Frequency : 10 ~ 55 Hz Amplitude : 1 mm Sweep time: 11 mins Test Period: 6 Cycles for each direction of X, Y, Z |
| 8 | Shock Test (non-operating) | 100G, 6ms Direction: ±X, ±Y, ±Z Cycle: 3 times |
| 9 | Electrostatic Discharge Test (non-operating) | 200pF , 0Ω ±200V 1 time / each terminal |

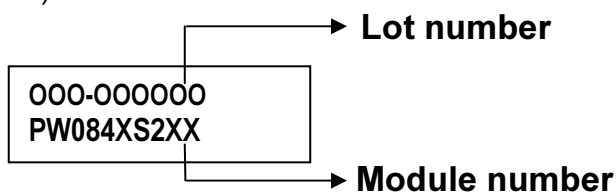
Ta: ambient temperature

[Criteria]

Under the display quality test conditions with normal operation state, there should be no change which may affect practical display function.

13. Indication of Lot Number Label

a) Indicated contents of the label



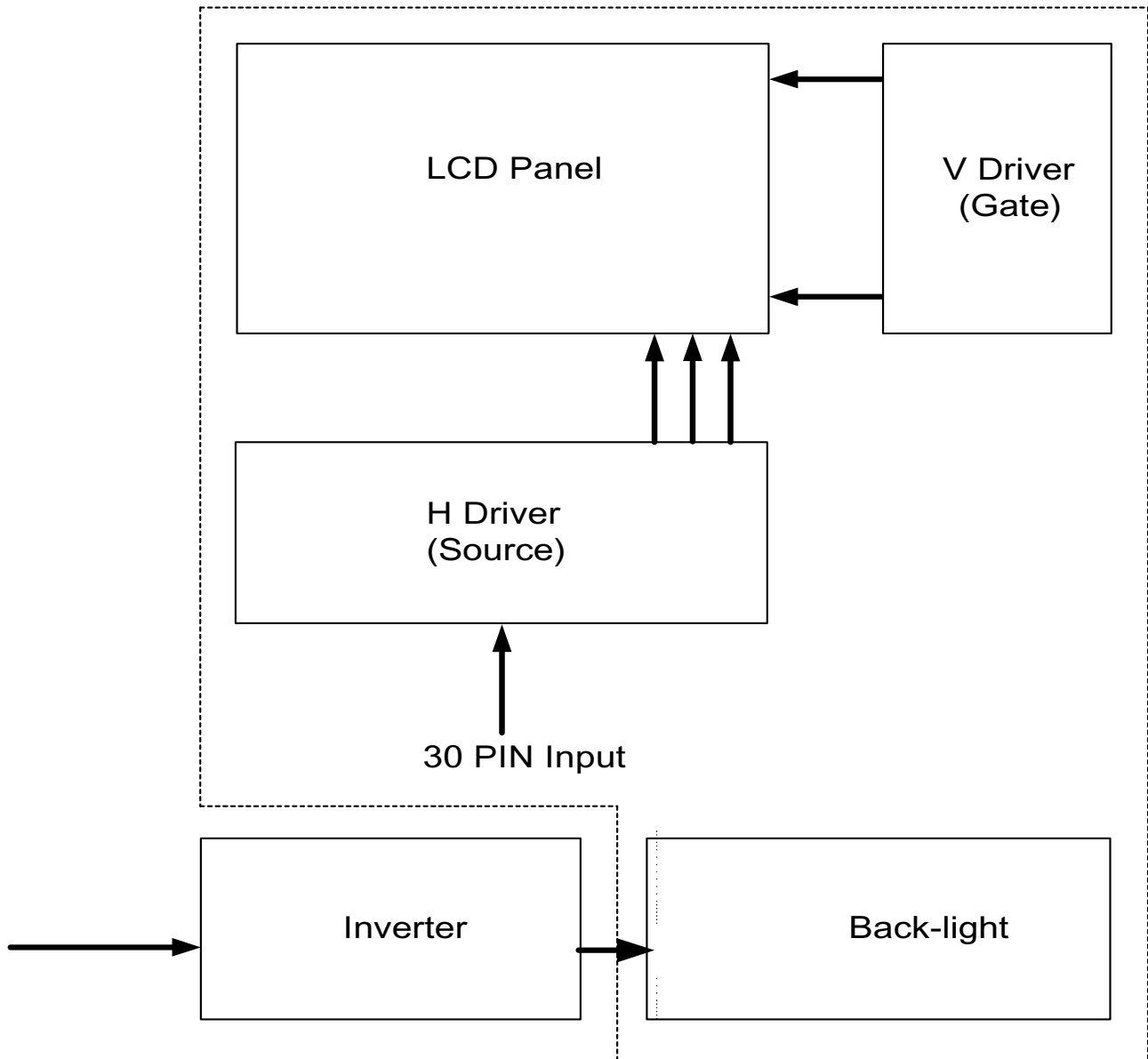
Contents of lot number : SB9—STC OEM product

5th—Production year : 1999⇒9, 2000⇒A, 2001⇒B.....

6th—Production month : 1, 2, 3,....9, A, B, C

7th~10th—Serial numbers : 0001~9999

14. Block Diagram



15. Packing

TBD

Revision History

| Rev. | Issued Date | Revised | Contents |
|------|---------------|---------|----------|
| 0.1 | Mar. 24, 2003 | NEW | |