TECHNICAL SPECIFICATION

CONTENTS

1. Application

This technical specification applies to 7.0” color TFT-LCD module, PW070XS2. 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

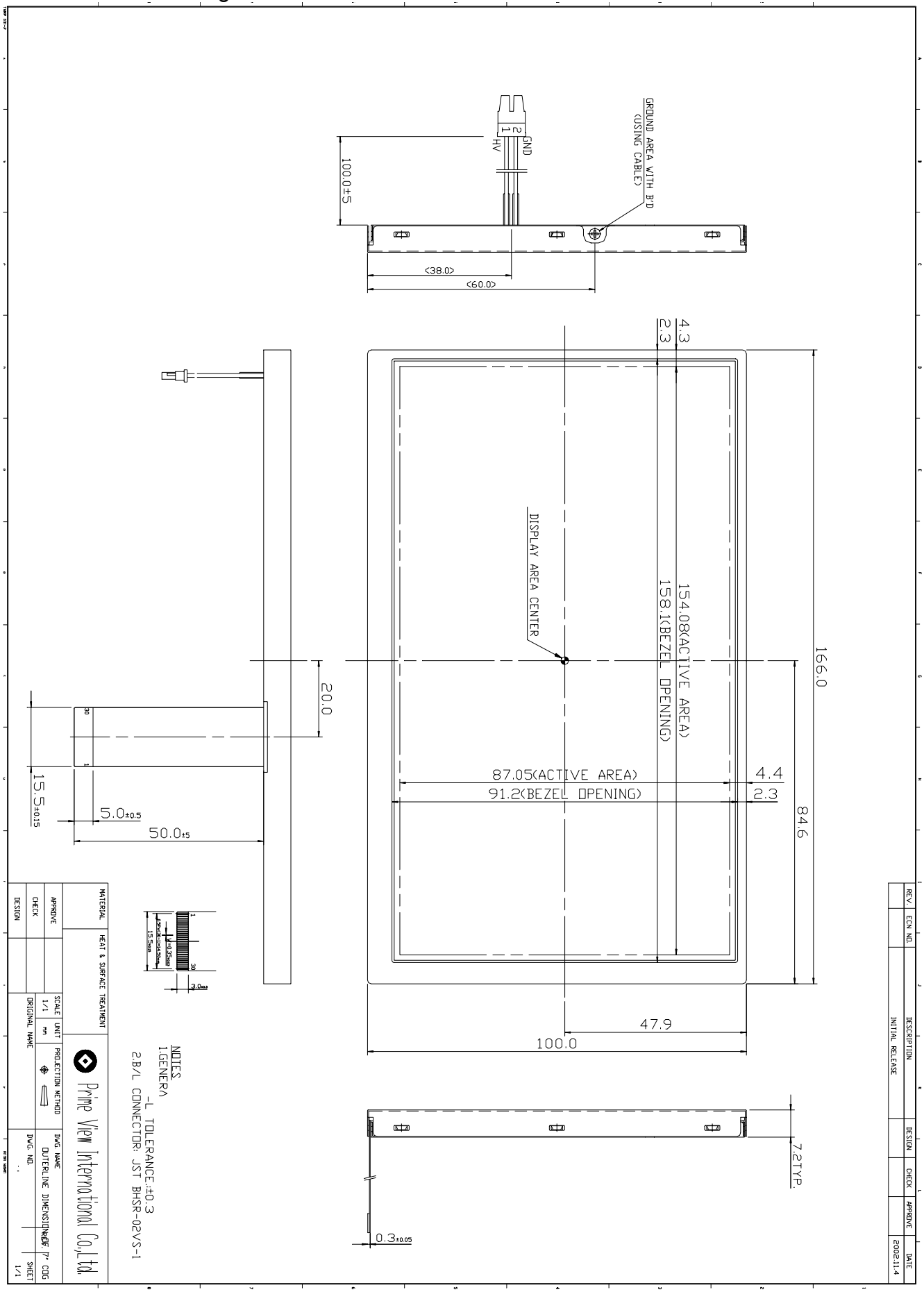
. Image Reversion：Up/Down and Left/Right

. 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	7.0 (16:9 diagonal)	Inch
Display Format	1440 (H) ×234(V)	dot
Active Area	154.08 (H)×87.05 (V)	mm
Dot Pitch	0.107(H)×0.372 (V)	mm
Pixel Configuration	Stripe	
Outline Dimension	166.0 (W)×100.0 (H)×7.2 (D) (typ.)	mm
Surface Treatment	Anti-Glare and Hard Coating	
Weight	180±10	g

4.Mechanical Drawing of TFT-LCD Module



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

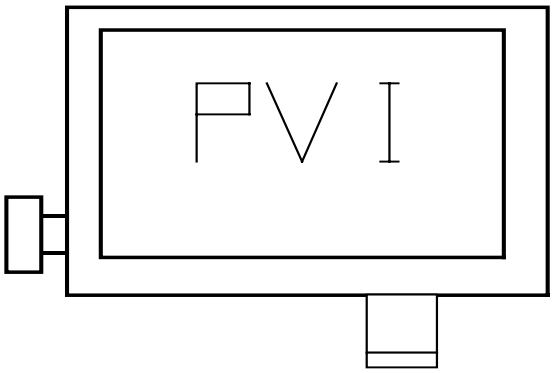
U/D	STVD	STVU	scanning direction
Vcc	Input	output	down to up
GND	Output	input	up to down

Note 5-2

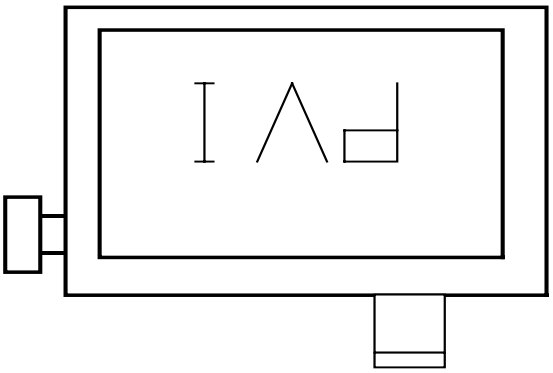
R/L	STHL	STHR	scanning direction
Vcc	output	input	left to right
GND	input	output	right to left

The definitions of Note 5-1,5-2

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



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



Note 5-3 : V_{CC} TYP.＝+5V

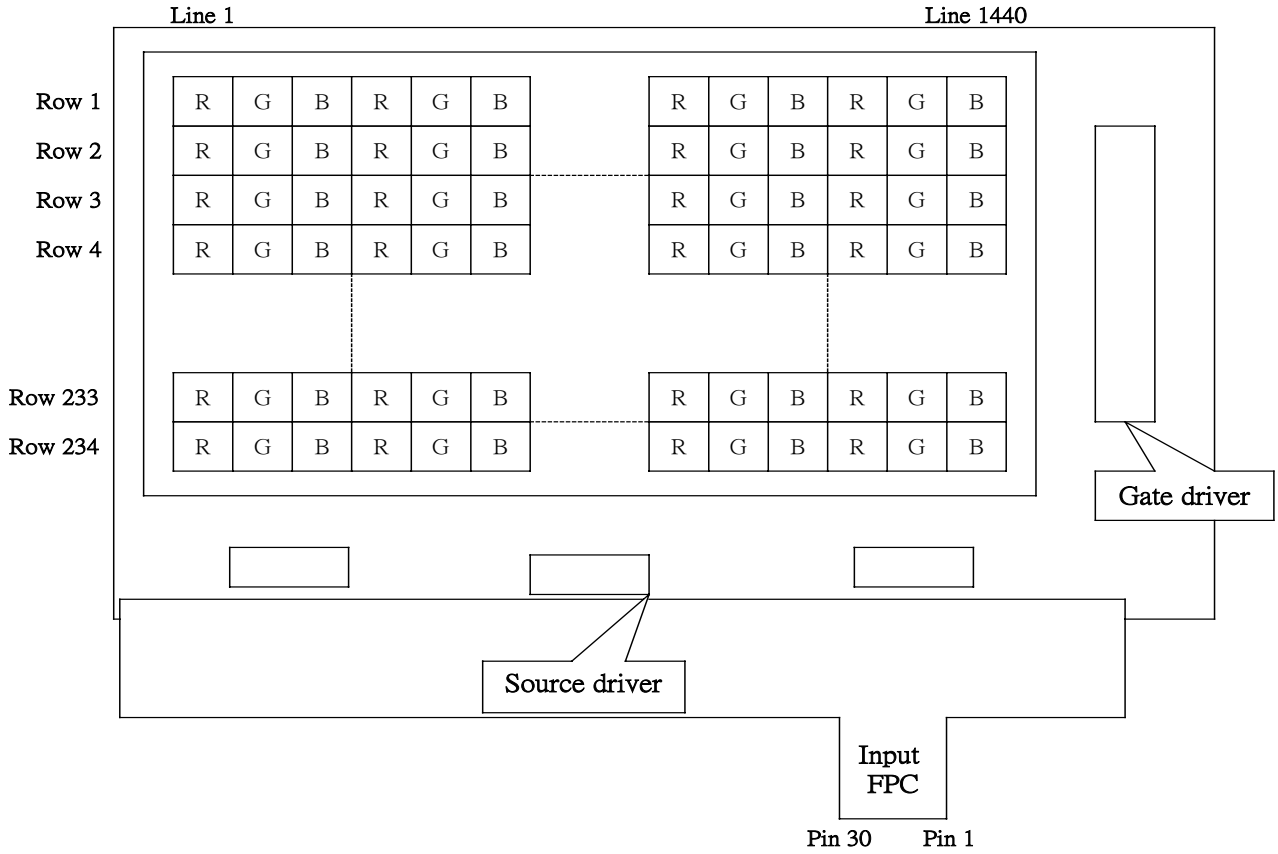
Note 5-4 : V_{EE} TYP.＝-12V

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			-20	+70	℃	
Operation Temperature			-10	+60	℃	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 Ta=+25℃.

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±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 ℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Lamp voltage	V_L	498	524	550	Vrms	I_L=6mA
Lamp current	I_L	3	6	8	mA	Note 8-2
Lamp frequency	P_L	40	55	80	KHz	Note 8-3
Starting voltage(25℃) (Reference Value)	Vs			630	Vrms	Note 8-4
Starting voltage(0℃) (Reference Value)	Vs			890	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 ℃

Parameter	Symbol	Conditions	TYP.	MAX	Unit	Remark
Supply current for Gate Driver (Hi level)	I_{GH}	V_{GH} = +17V	0.010	0.012	mA	
Supply current for Gate Driver (Low level)	I_{EE}	V_{EE} = -12V	0.100	0.120	mA	
Supply current for Source Driver(Digital)	I_{DD1}	V_{DD1} = +5V	1.800	2.200	mA	
Supply current for Source Driver(Analog)	I_{DD2}	V_{DD2} = +5V	9.000	11.000	mA	
Supply current for Gate Driver (Digital)	I_{CC}	V_{CC} = +5V	0.030	0.050	mA	
LCD Panel Power Consumption			55.52	67.900	W	Note 8-5
Back Light Lamp Power Consumption			3.15		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

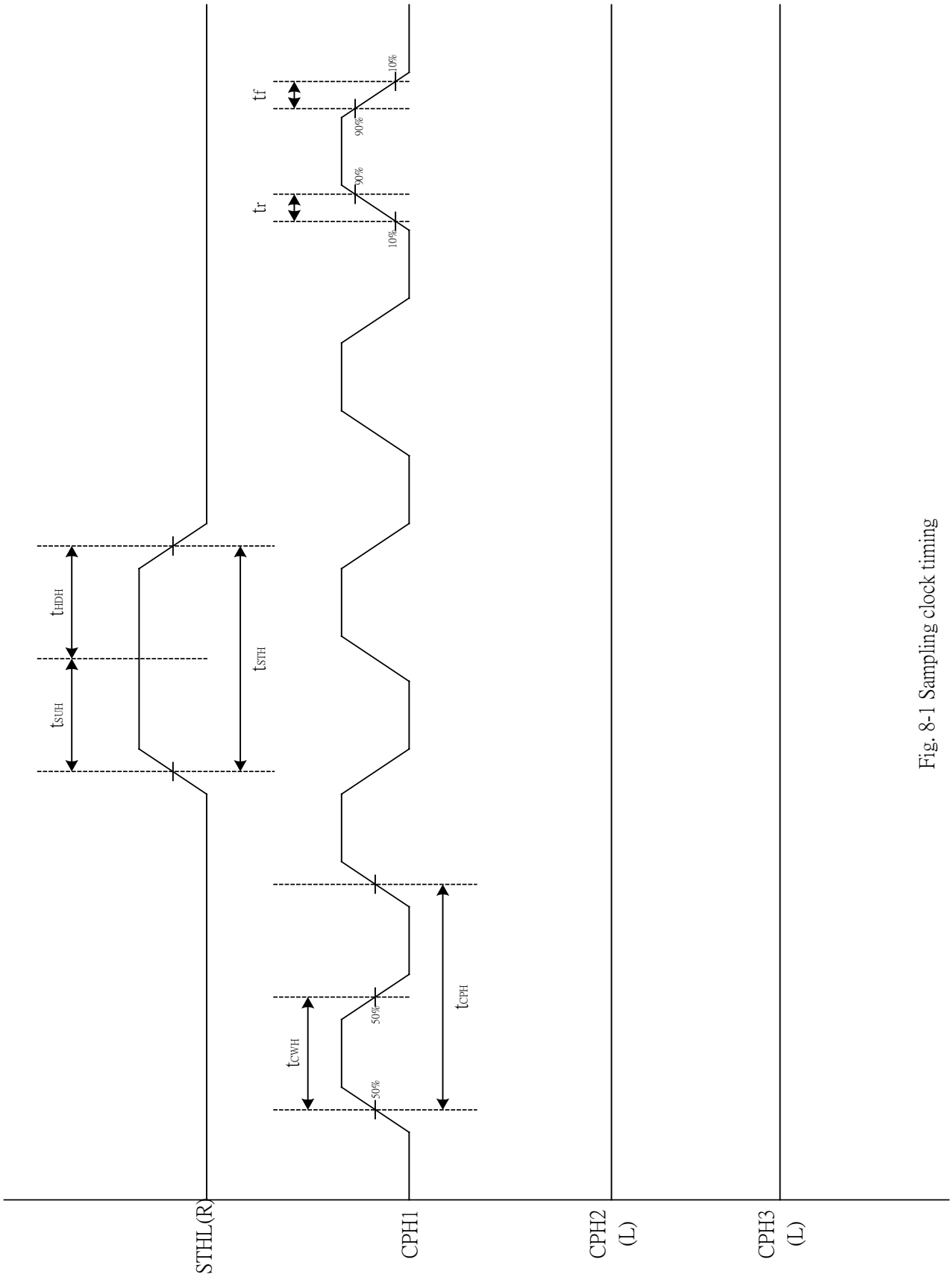


Fig. 8-1 Sampling clock timing

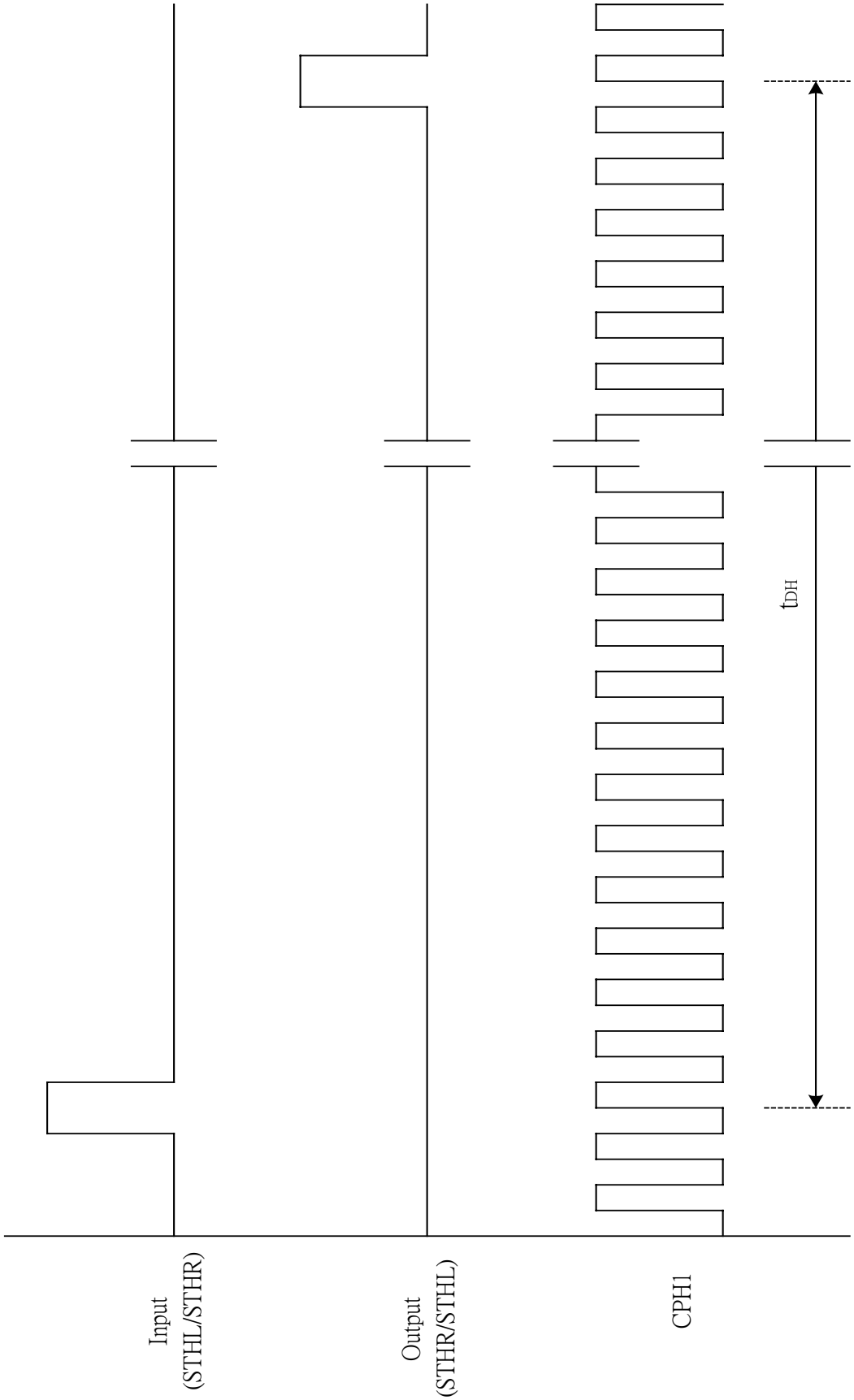


Fig. 8-2 Horizontal display timing range

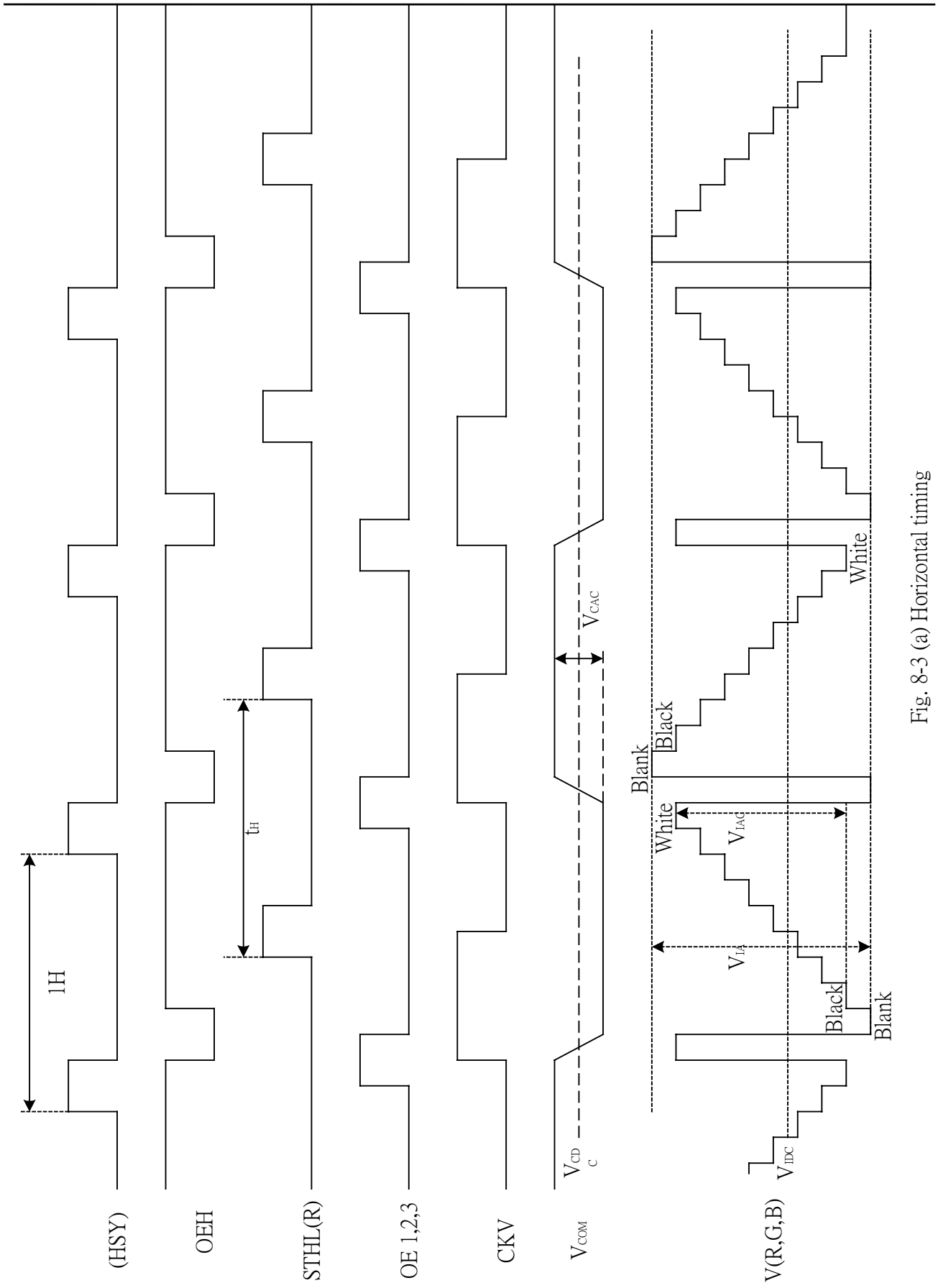
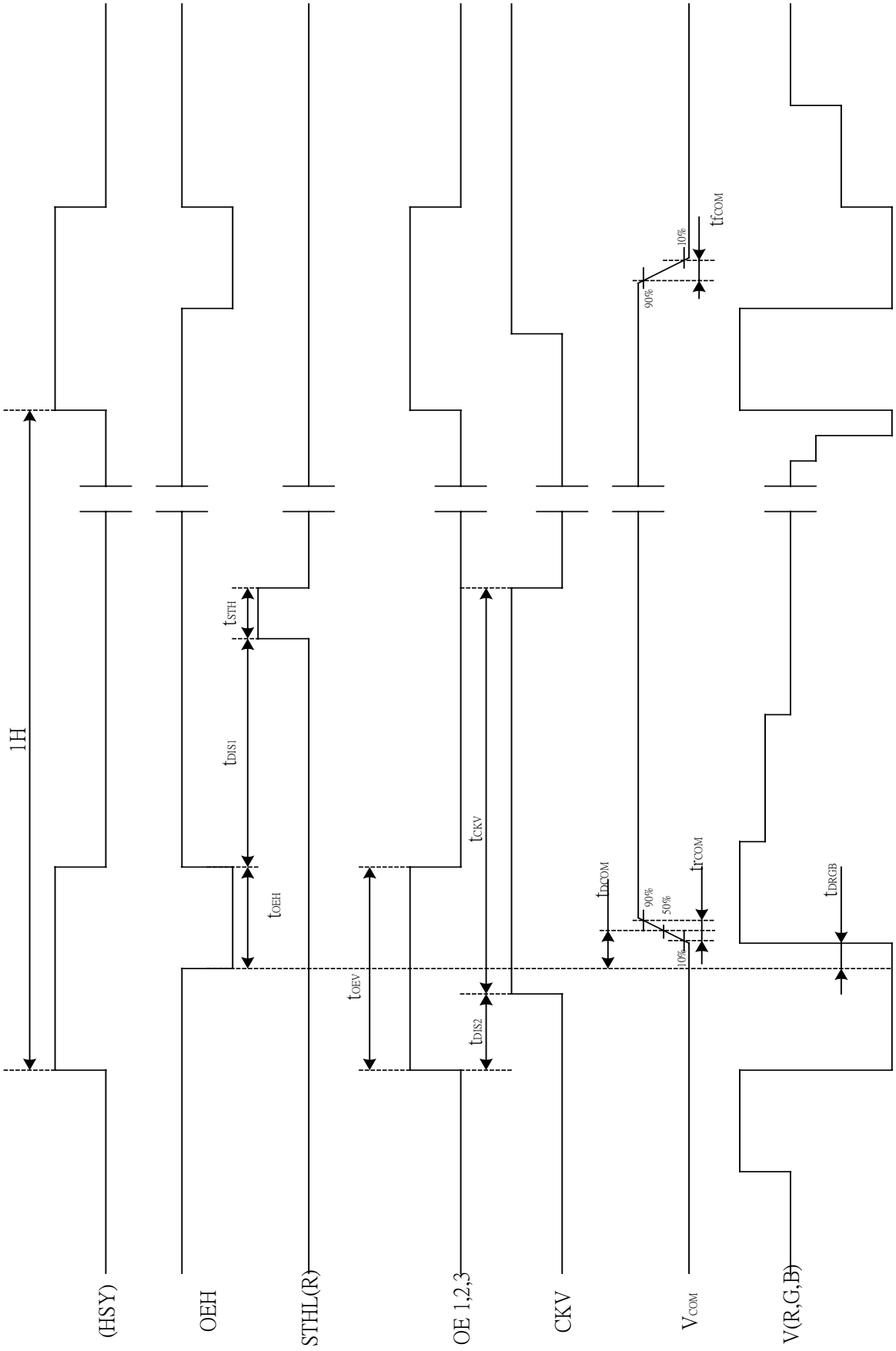


Fig. 8-3 (a) Horizontal timing



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

Fig. 8-3 (b) Detail horizontal timing

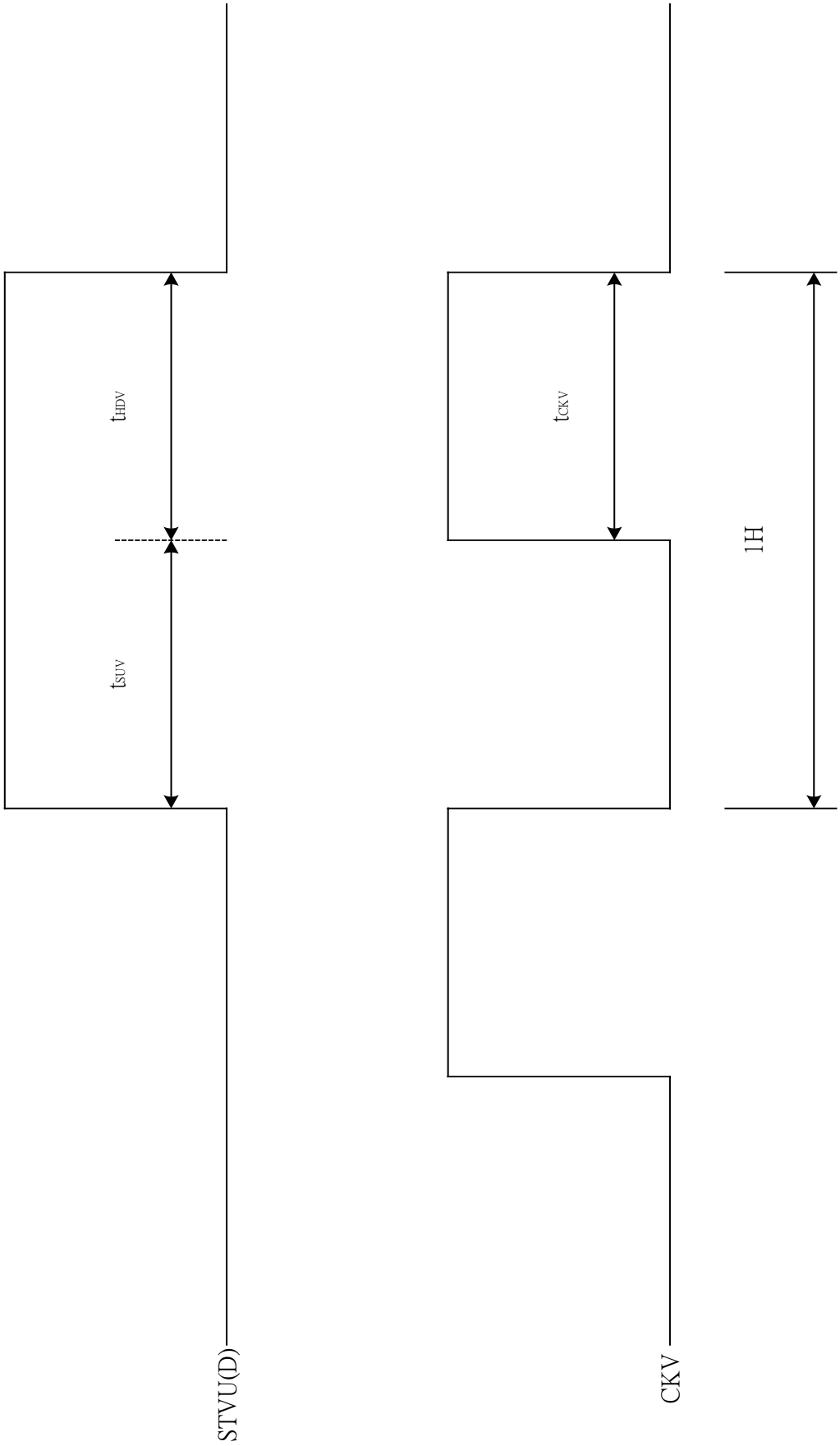


Fig. 8-4 Vertical shift clock timing

Vertical timing (From up to down)

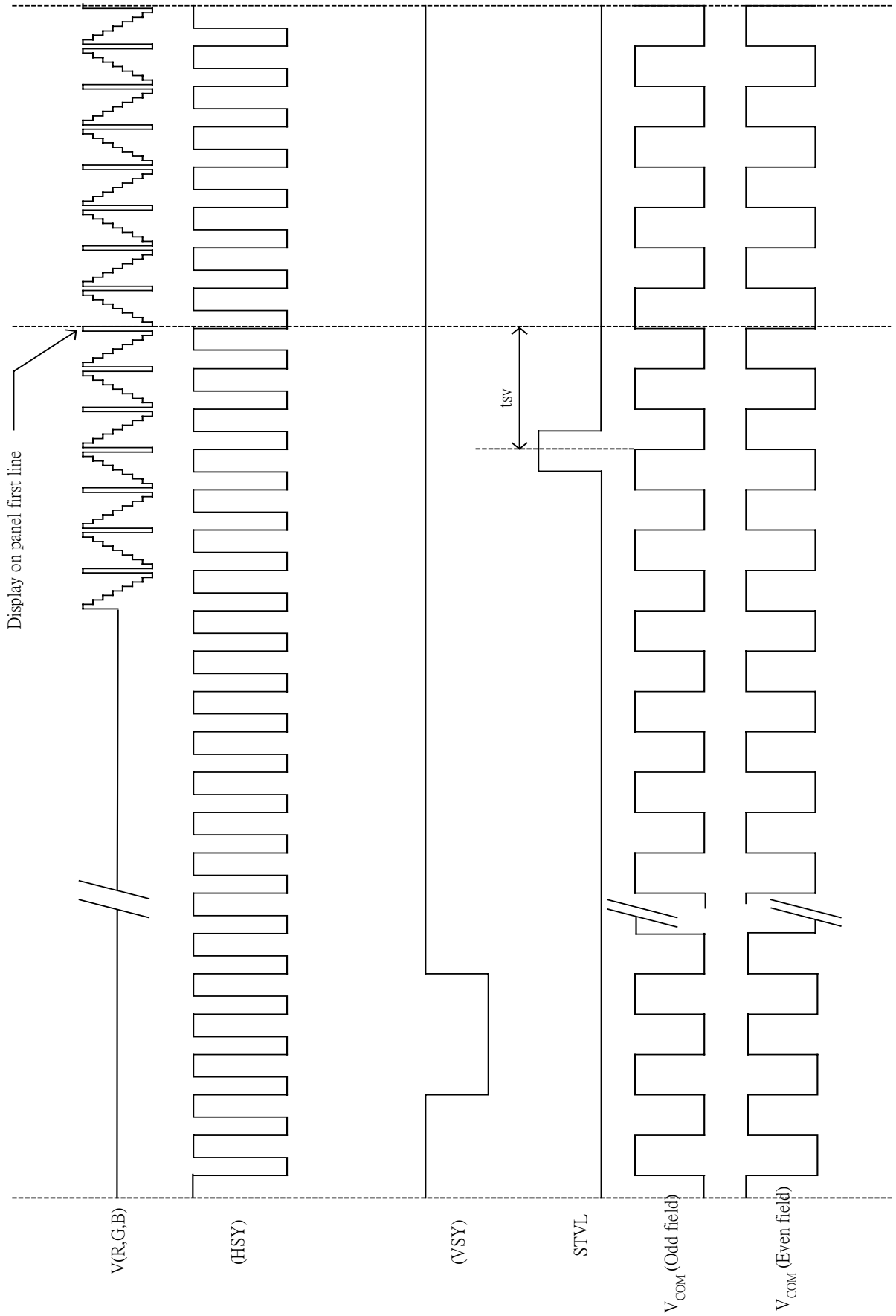


Fig. 8-5 (a) Vertical timing (From Up to Down)

Vertical timing (From down to up)

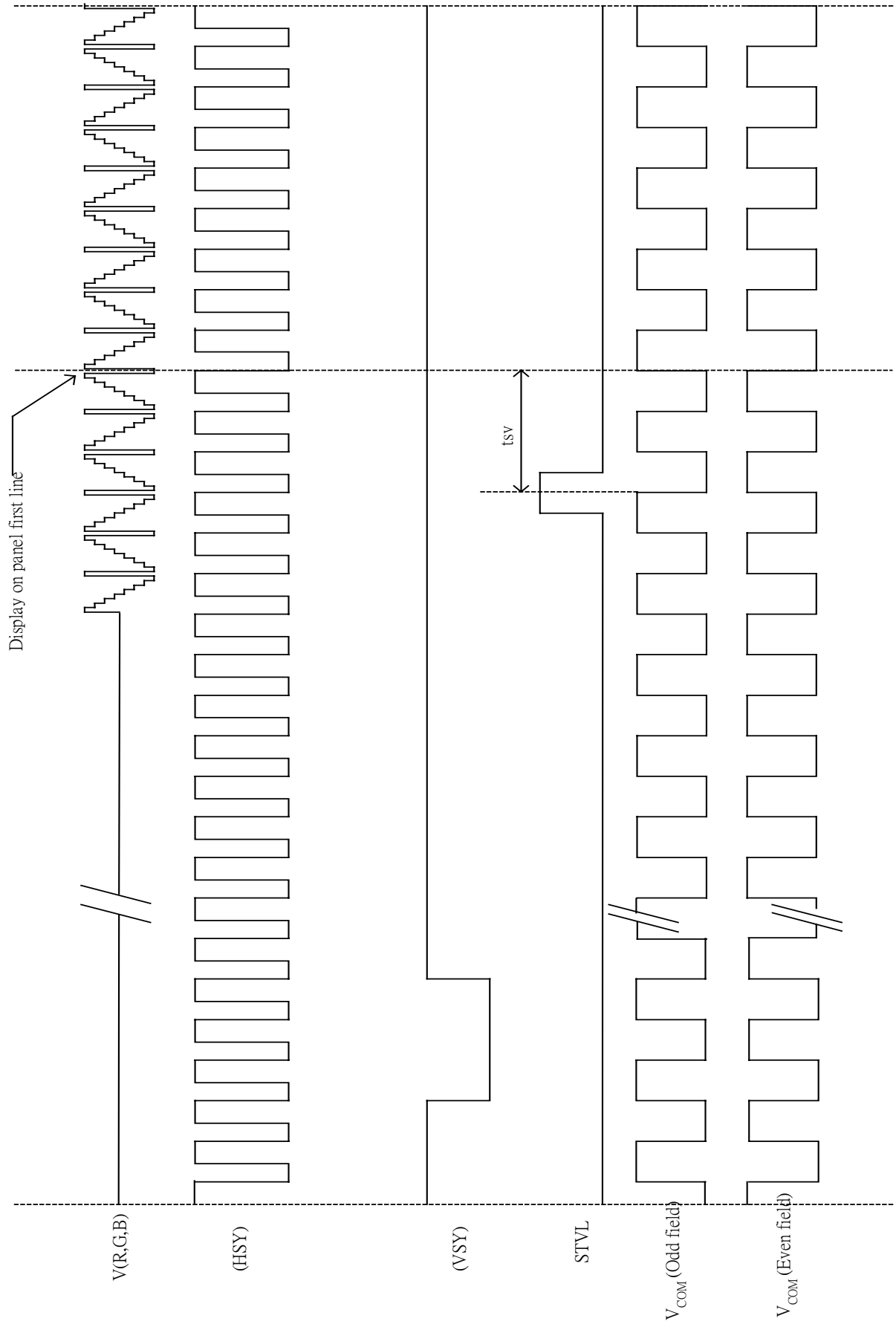
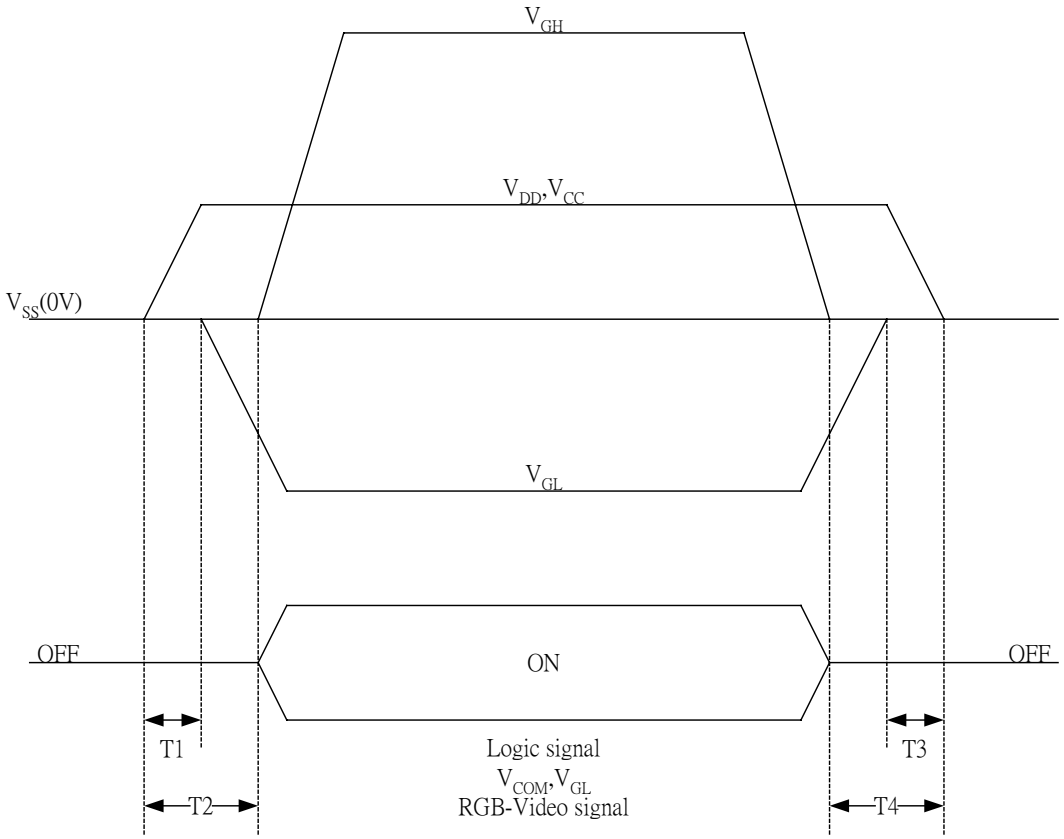


Fig. 8-5 (b) Vertical timing (From Down to Up)

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≦T1<T2
2) 0ms<T3≦T4≦10ms

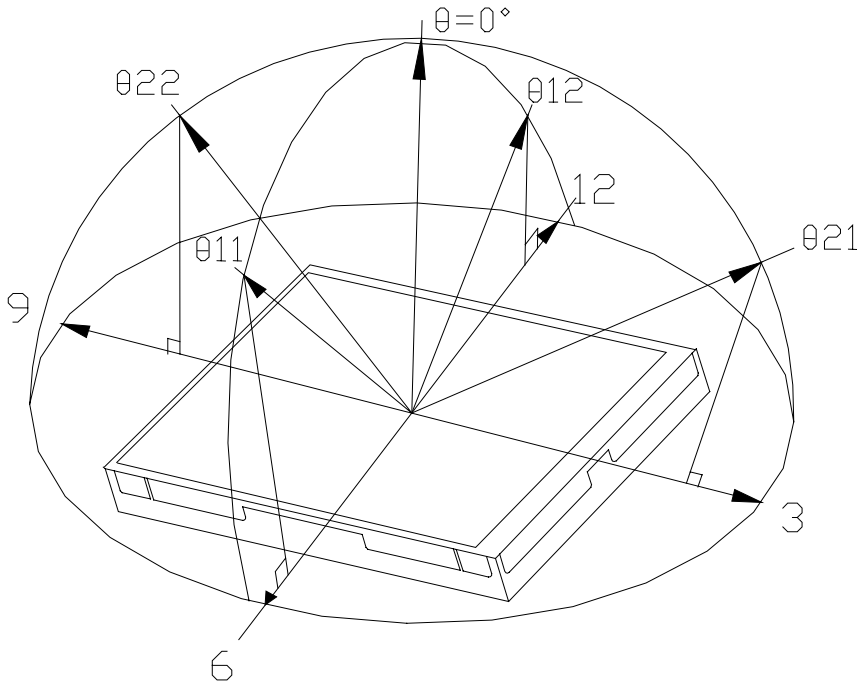
10. Optical Characteristics

10-1) Specification

Ta = 25℃

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ 21, θ 22	CR≧10	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	Tr	θ =0°		15	30	ms	Note 10-4
	Fall	Tf			25	50	ms	
Brightness				350	400		cd/㎡	Note 10-3
Transmission Ratio		T		7.8	8.3		%	
Uniformity		U		70	75		%	Note 10-5
White Chromaticity		x	θ =0°	0.270	0.300	0.330		Note 10-3
		y		0.297	0.327	0.357		
		Tc		6800	7100	7400	K	
Lamp Life Time +25℃					40000		hr	

Note 10-1 : The definitions of viewing angles



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

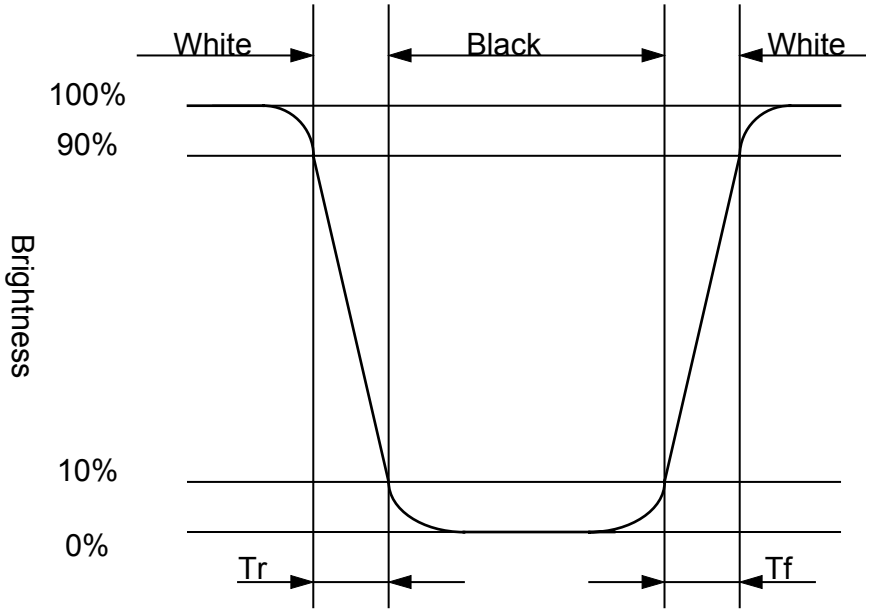
(Testing configuration see 8-2)

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:

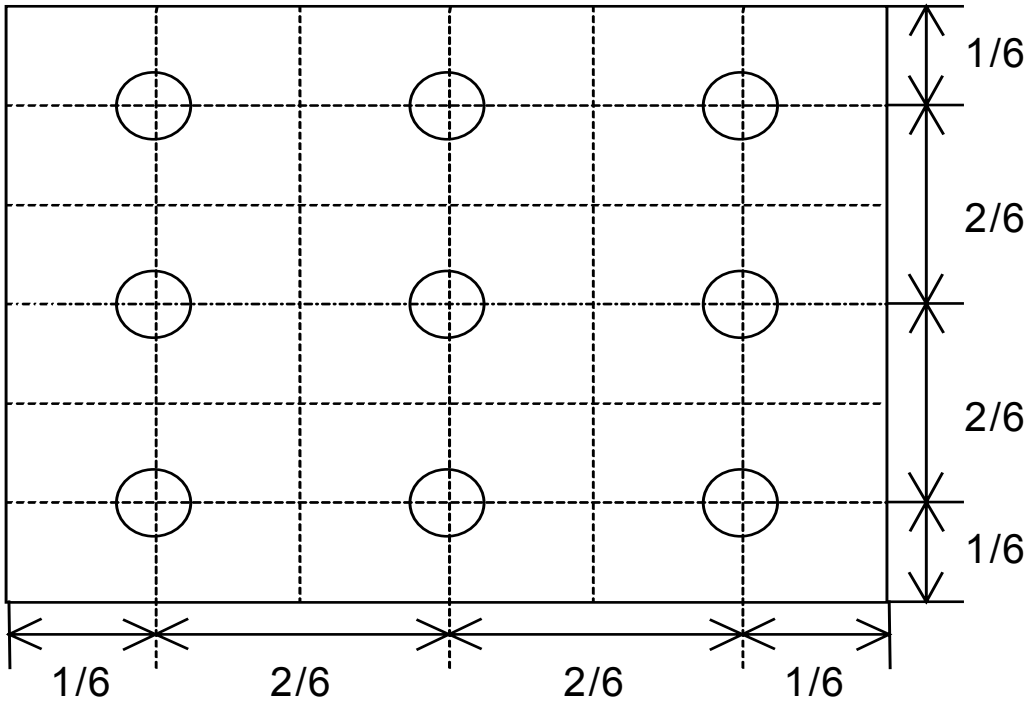


Note 10-5 : The uniformity of LCD is defined as

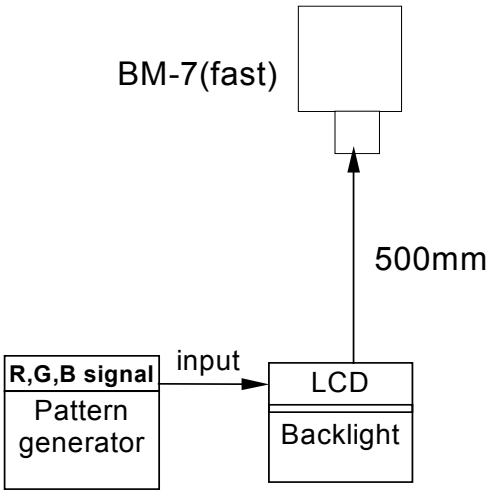
$$U = \frac{\text{The Minimum Brightness of the 9 testing Points}}{\text{The Maximum Brightness of the 9 testing Points}}$$

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).

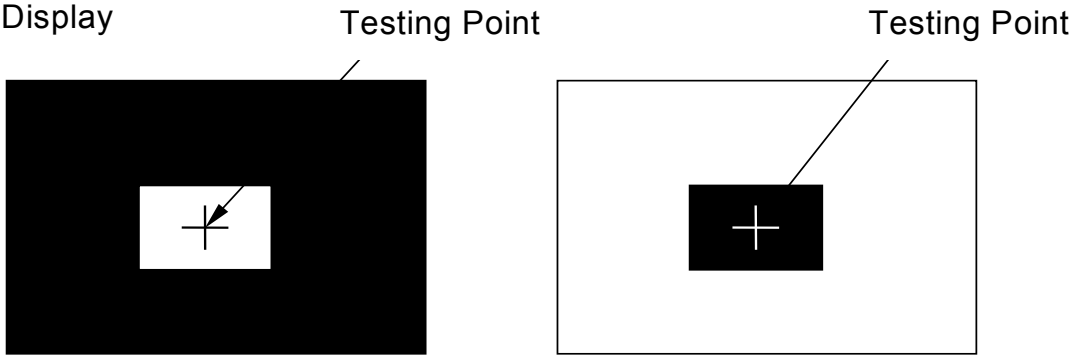


10-2) Testing configuration



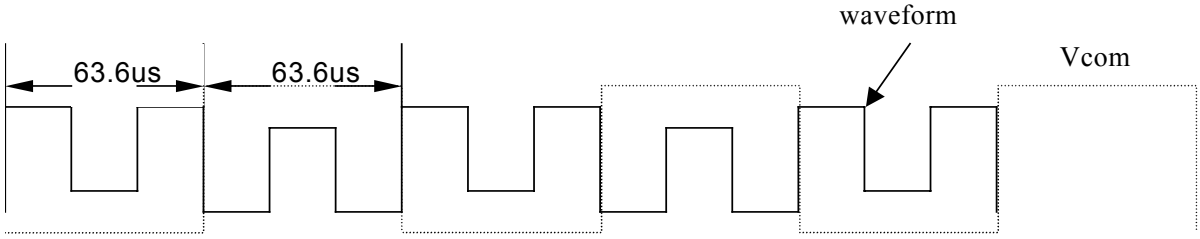
Caution: 1. Environmental illumination ≦ 1 lux
2. Before test CR, Vcom voltage must be adjusted carefully to get the best CR.

- LCD Display

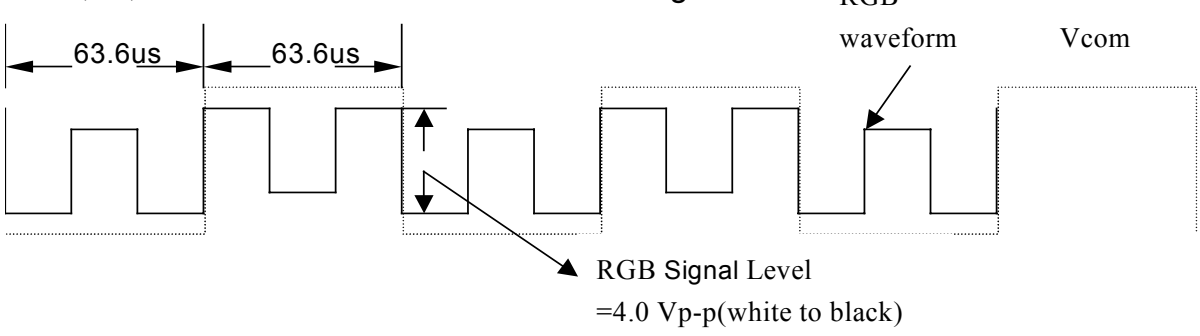


Pattern A Pattern B

- 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

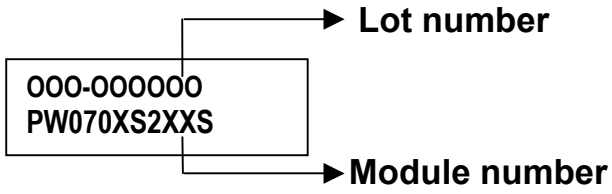
No	Test Item	Test Condition
1	High Temperature Storage Test	Ta = +70℃, 240 hrs
2	Low Temperature Storage Test	Ta = -20℃, 240 hrs
3	Low Temperature Operation Test	Ta = -10℃, 240 hrs
4	High Temperature & High Humidity Operation Test	Ta = +60℃, 90%RH, 240 hrs
5	Thermal Cycling Test (non-operating)	-25℃→+25℃→+70℃,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



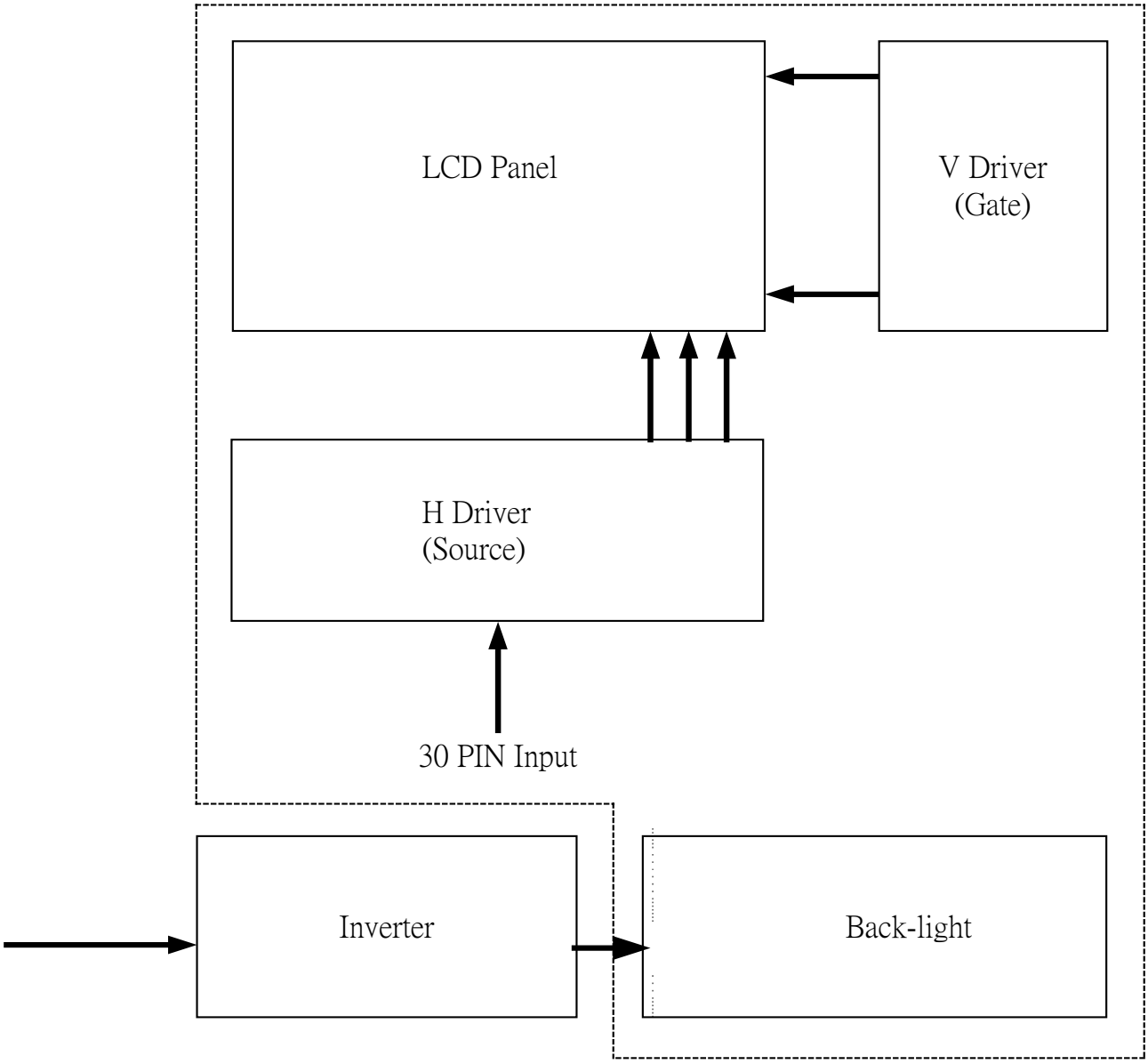
Contents of lot number : SB9—STC OEM product

5_{th}—Production year : 1999⇒9, 2000⇒A, 2001⇒B……..

6_{th}—Production month : 1, 2, 3,….9, A, B, C

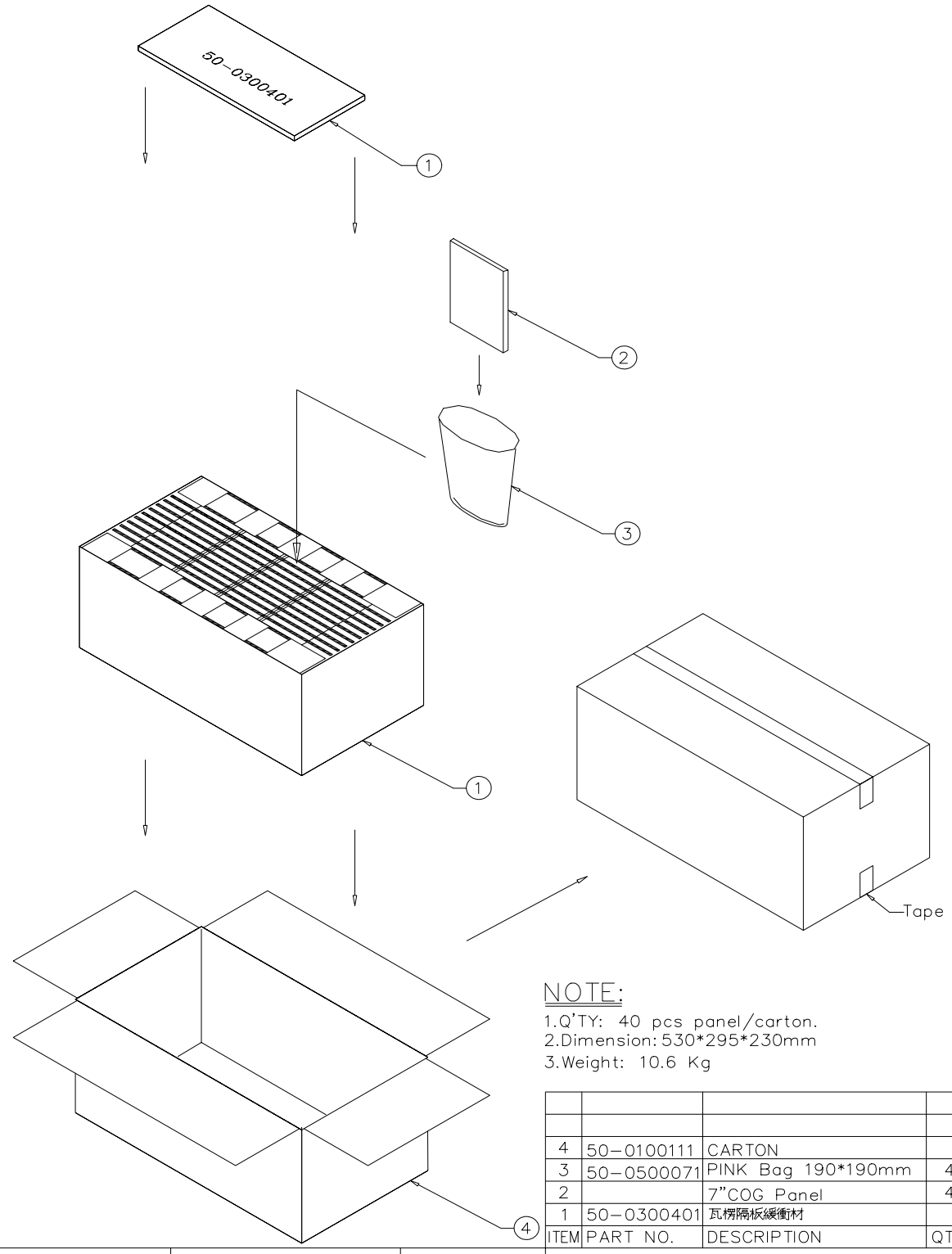
7_{th}~10_{th}—Serial numbers : 0001~9999

14. Block Diagram



15. Packing

ZONE	REV.	DOCUUMENT NO.	DESCRIPTION	DATE	REV.BY



NOTE:
1.Q'TY: 40 pcs panel/carton.
2.Dimension: 530*295*230mm
3.Weight: 10.6 Kg

ITEM	PART NO.	DESCRIPTION	QTY	REMARK
4	50-0100111	CARTON	1	
3	50-0500071	PINK Bag 190*190mm	40	抗靜電
2		7"COG Panel	40	
1	50-0300401	瓦楞隔板緩衝材	1	上蓋+ 底座

MTL.SPEC.	UNSPECIFIED TOL'S ANGLE ROUGHNESS	REMARK	元太科技工業股份有限公司 Prime View International Co., Ltd.

APPROVE		. .	SCALE	UNIT	SHEET 1 OF 1	DWG.TITLE: 7"COG Model Packing Draw
CHECK		. .				
DRAWN	Jimmy	'03.02.12	MTL.NO.	DWG FILE:	REV. 01	A4 SIZE

Revision History

Rev.	Issued Date	Revised Contents
0.1	Dec. 16, 2002	NEW
1.0	Feb. 11,2003	Confirm Page 3 Mechanical Specifications (Weight) Confirm Page 8 back light specification and Power Consumption Modify Page 17 optics specification Modify Page 22 Reliability Test (High Temperature & High Humidity Operation Test from 60℃,95% to from 60℃,90%, Thermal Cycling Test from -30℃→+25℃→+80℃ to-25℃→+25℃→+70℃) Modify Page 24 packing drawing Modify Page 22 reliability test(Electrostatic Discharge Test method)