Version: 5.0

TECHNICAL SPECIFICATION

MODEL NO: PW065XSA

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Please contact PVI or its agent for further information.

☐Customer's Confirmation

Customer _____

Date _____

By _____

☐PVI's Confirmation

Confirmed By Tommy Chang

Prepared By

Revision History

Rev.	Issued Date	Revised Contents
1.0	Feb. 02, 2007	New
2.0	May. 23, 2007	Page 24 12. Reliability Test High Temp. Operation Test change from 80℃ to 85℃
3.0	Jul. 23, 2007	Modify page6 Mechanical Drawing from： Polarizer：143.4*79.32mm，Bazel Open：145.4*81.32mm change to： Polarizer：145.2*81.12mm，Bazel Open：146.2*82.12mm
4.0	Aug 22, 2007	Page23 Handing Caution： From： Original：a, b, c, d items, now deleted item b) Change to： Modify to：a, b, c items.
5.0	Nov. 16. 2007	Page 4：Modify the reference of viewing angle to be Note 10-1 Page 5：Add the dimension of protect film on the polarizer Page 6 and 8：Add the Note 5-6, the description for the CPH1, CPH2 and CPH3 Page 10：Modify the item 8-3) Modify the Typ. voltage value as "-" Modify the power consumption value as "-" Add the Note 8-1：List the constant current for the LED backlight Modify the Note 8-1, 8-2 to be Note 8-2 and 8-3, and add the total current for the LED backlight of Note 8-2 Modify the diagram of LED B/L Page 11：Modify the power consumption： Modify the Typ. value of LED B/L as "-" Modify the Typ. value of total power consumption as "-" Add the Max. values for the LCD panel, LED B/L and total power consumption.

TECHNICAL SPECIFICATION

CONTENTS

1. Application

This technical specification applies to 6.5” color TFT-LCD module, PW065XSA
The applications of the panel are car TV, portable DVD, GPS, multimedia applications and others AV system.

2. Features

. Pixel in stripe configuration

. Compatible with NTSC & PAL system

. Slim and compact

. High Brightness

.Up /Down and Left/Right Image Reversion

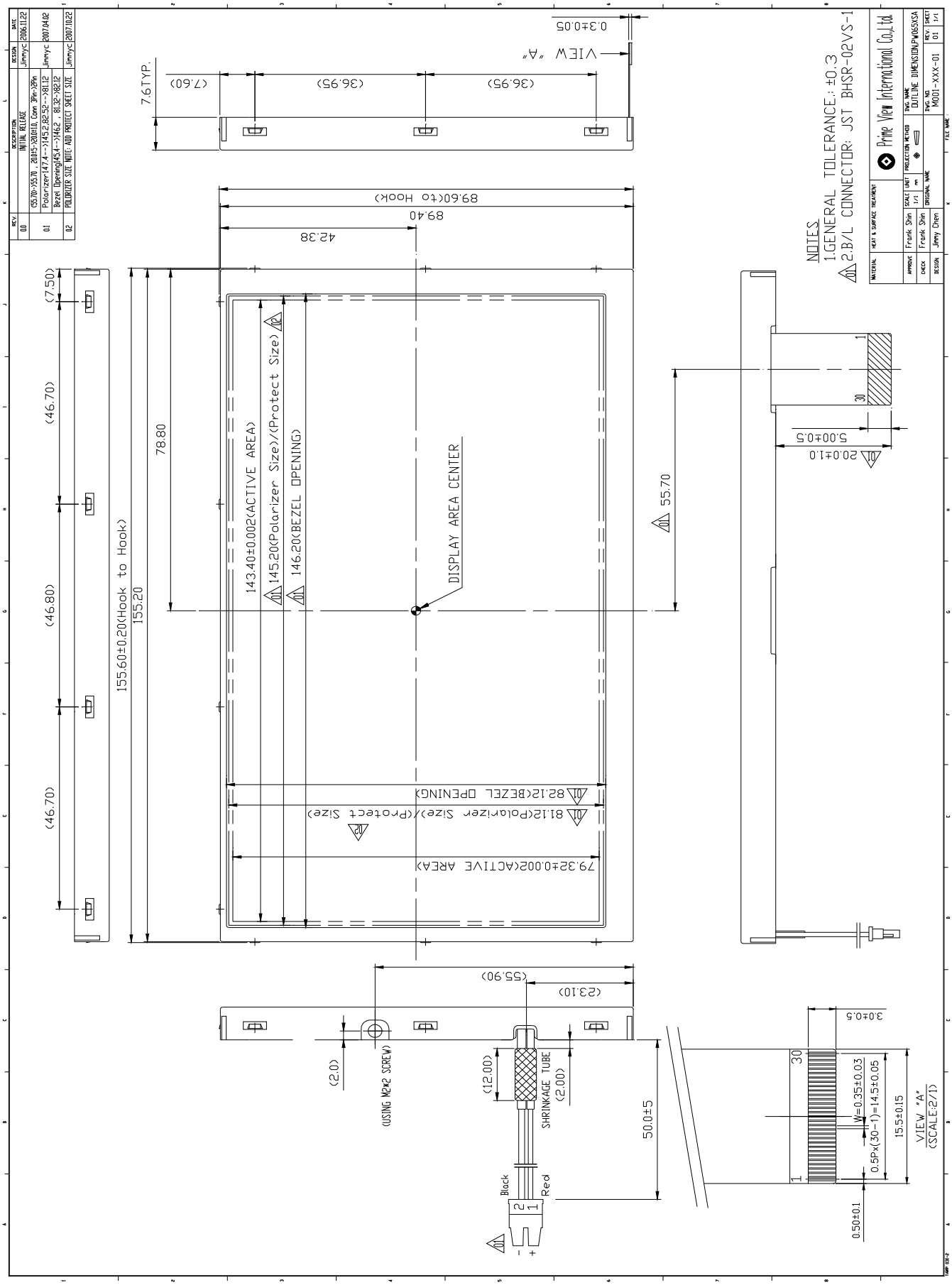
.Wide Viewing Angle

. Support multi display mode
(If you use this mode, you must use PVI-1004D’s timing controller (made by PVI))

3. Mechanical Specifications

Parameter	Specifications	Unit
Screen Size	6.5 (16:9 diagonal)	inch
Display Format	400×(R,G,B)×234	dot
Display Colors	262,144	
Active Area	143.40 (H) × 79.32(V)	mm
Pixel Pitch	0.3585 (H) × 0.339(V)	mm
Pixel Configuration	Stripe	
Outline Dimension	155.2(W) × 89.4(H) × 7.6(D)(typ.)	mm
Weight	166±10	g
LED Back-light	24-LED	
Surface Treatment	Anti – Glare &WV film	
Display mode	Normally white	
Gray scale inversion direction	6 o’clock [ref to Note 10-1]	

4. Mechanical Drawing of TFT-LCD Module



5. Input / Output Terminals

TFT-LCD Module Connector
FPC Down Connect , 30Pins , 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 for gate driver	Note 5-2
5	NC	-	No connection	
6	V_{GH}	I	Positive power for gate driver	Note 5-4
7	NC	-	No connection	
8	STVD	I/O	Vertical start pulse	Note 5-5
9	STVU	I/O	Vertical start pulse	Note 5-5
10	CKV	I	Shift clock for gate driver	
11	U/D	I	Up / Down Control for gate driver	
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	Note 5-1
16	STHL	I/O	Start pulse for source driver	Note 5-5
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 5-3
23	CPH1	I	Sampling and shift clock for source driver	Note 5-6
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 5-3
27	R/L	I	Left / Right Control for source driver	Note 5-5
28	NC	I	No Connection	
29	OEH	I	Output enable for source driver	
30	STHR	I/O	Start pulse for source driver	Note 5-5

Note 5-1：$V_{COM\ (TYP.)} = 6V_{PP}$.

Phase of the video signal input and V_{COM}
The relation between these values could refer to 8-1 Operating condition.

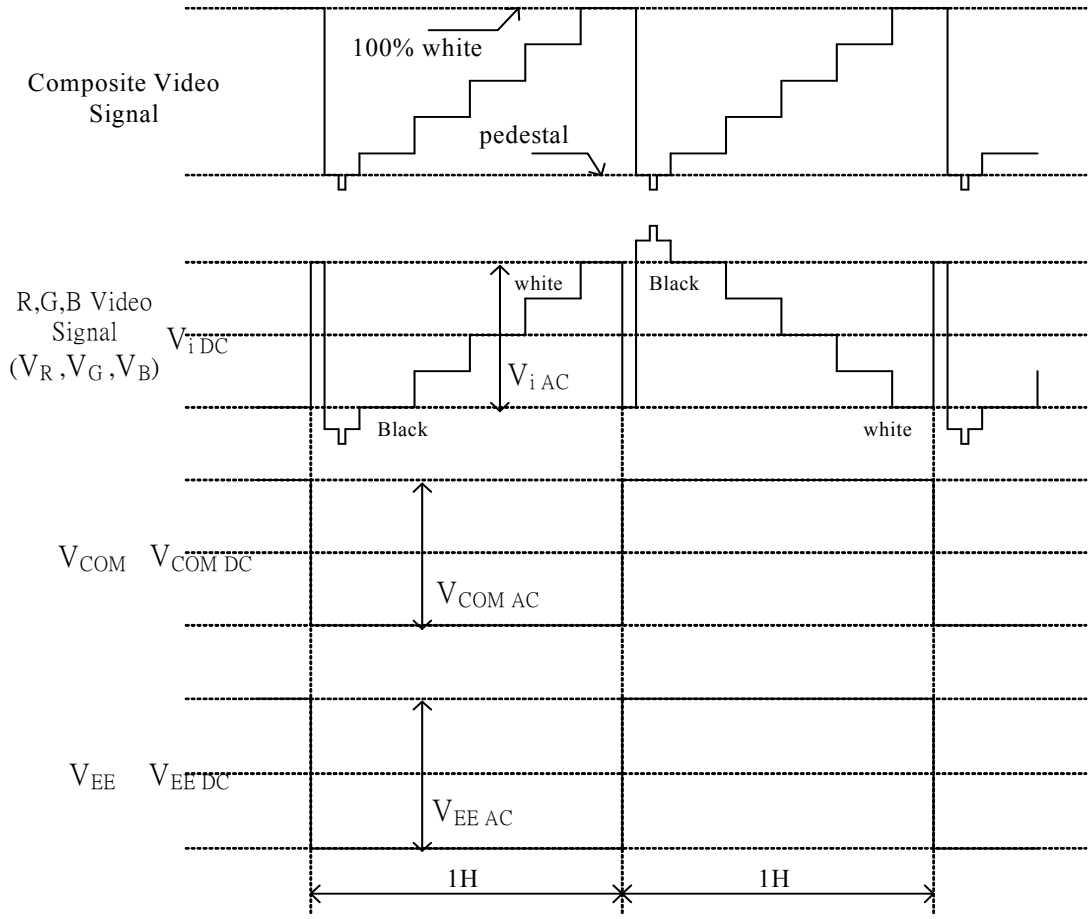


Fig.1

Liquid crystal transmission of the video signal input, V_{COM} and timing

	V_{COM}	
	H Level	L Level
Video Signal Input Maximum	Black	White
Video Signal Input Minimum	White	Black

White : maximum transmission / Black : minimum transmission

Note 5 – 2 : $V_{EE\ (TYP.)} = -12V$ (Typ.).

Note 5 – 3 : V_{DD1}, $V_{CC(TYP.)} = +3.3V$, $V_{DD2\ (TYP.)} = +5.0V$ (Typ.)

Note 5 – 4 : $V_{GH(TYP.)} = +15V$ (Typ.).

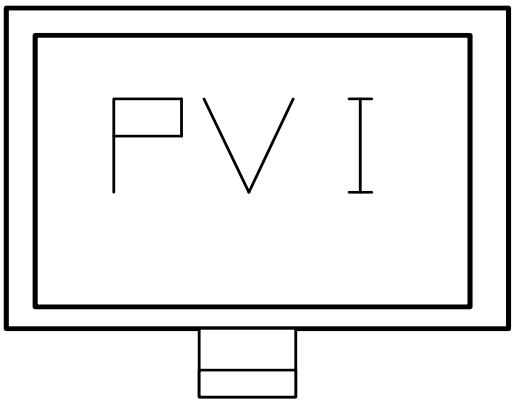
Note 5 – 5 : STHL, STHR and R/L mode

R/L	STHL	STHR	Remark
High(V_{DD1})	Output	Input	Left to Right
Low(0 Volt.)	Input	Output	Right to Left

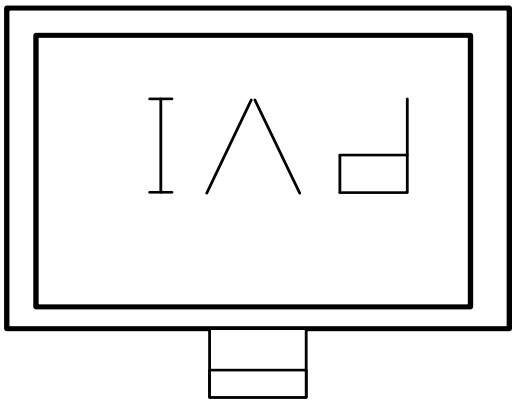
STVU,STVD,and U/D mode

U/D	STVD	STVU	Remark
High(V_{CC})	Input	Output	Down to Up
Low(0 Volt.)	Output	Input	Up to Down

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

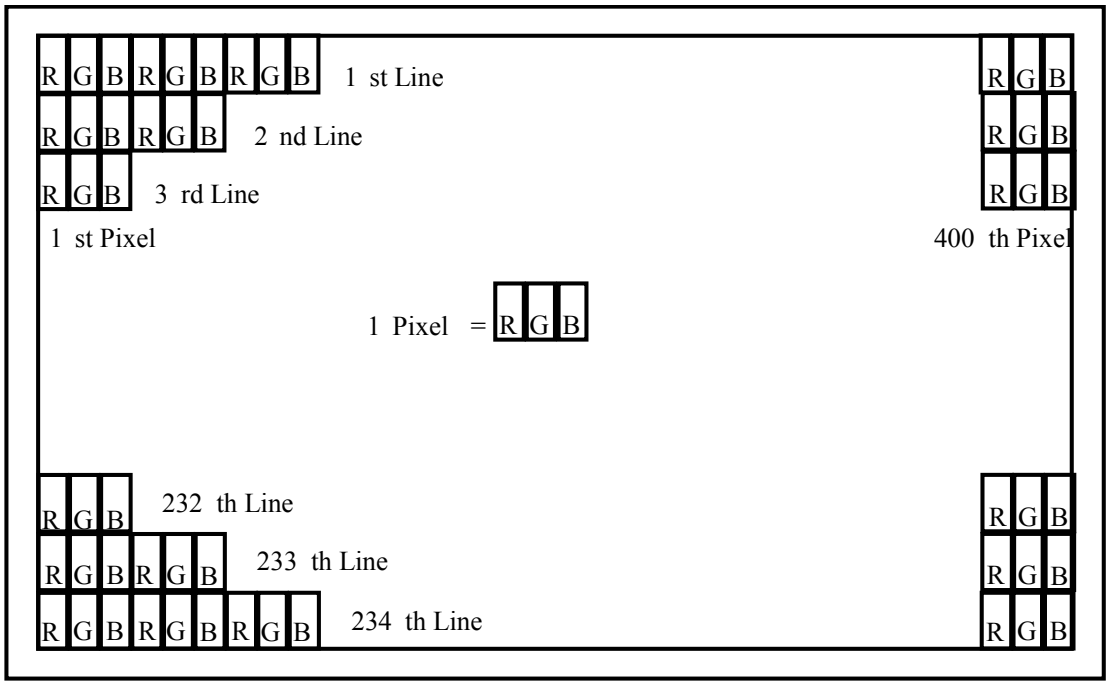


U/D(PIN 11)=High R/L(PIN 27)=Low



Note 5-6：The CPH1 refers to Fig.8-1：sampling clock timing.
CPH2 and CPH3 connect GND.

6. Pixel Arrangement



7. Absolute Maximum Ratings：

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

GND = 0V ， Ta = 25℃

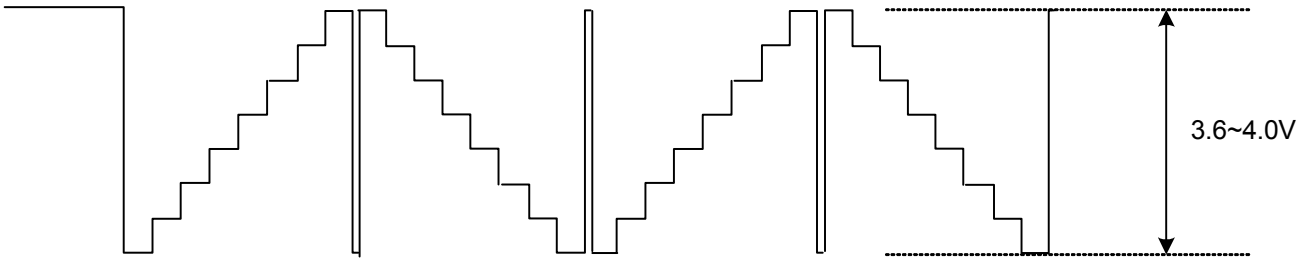
Parameter		Symbol	MIN.	MAX.	Unit	Remark
Supply Voltage For Source Driver		V_{DD2}	-0.3	+5.8	V	
		V_{DD1}	-0.3	+7.0	V	
Supply Voltage For Gate Driver		V_{CC}	-0.3	+6.0	V	
		V_{GH}-V_{EE}	-0.3	+40	V	
	H Level	V_{GH}	-0.3	+25.0	V	
	L Level	V_{EE}	-16	+0.3	V	

8. Electrical Characteristics

8-1) Operating Condition

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}	+3.0	+3.3	+3.6	V	Depend on T/C signal voltage
			+4.5	+5.0	+5.5	V	
Supply Voltage For Gate Driver	V_{GH}		+14.3	+15	+15.7	V	
	$V_{EE\ DC}$		-12.5	-12	-11.5	V	DC Component of V_{GL}
	$V_{EE\ AC}$		-	+6.0	-	V_{P-P}	AC Component of V_{GL}
	Logic	V_{CC}	+3.0	+3.3	+3.6	V	Depend on T/C signal voltage
			+4.5	+5.0	+5.5	V	
Analog Signal input Level (V_R , V_G , V_B)	V_{IAC}		-	+3.6	+4.0	V	Note 8-1
	V_{IDC}		-	+2.5	-	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}
		$V_{COM\ DC}$	-	1.5	-	V	DC Component of V_{COM} Note 8-2

Note 8-1 : Both NTSC and PAL system Video Signal input waveform is based on 8 steps gray scale.



Note 8-2 : 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) Current Consumption (GND=0V)

Ta= 25 ℃

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Current for Driver	I_{GH}	V_{GH}=+15V	-	0.102	0.128	mA	
	I_{CC}	V_{CC}=+3.3V	-	0.026	0.032	mA	
	I_{DD}	V_{DD1}=+3.3V	-	1.2	3.6	mA	
	I_{EE}	V_{EE}=-12V	-	0.14	0.18	mA	
	AI_{DD}	V_{DD2}=+5V	-	5.0	8.0	mA	

8-3) LED Backlight driving & Power Consumption
Connector type: JST BHSR-02VS-1, PIN No 2 pins, pitch=3.5mm

Pin No	Symbol	Description	Remark
1	+	Input terminal (Positive electrode side)	Wire color : Red
2	-	Input terminal (Ground side)	Wire color : Black

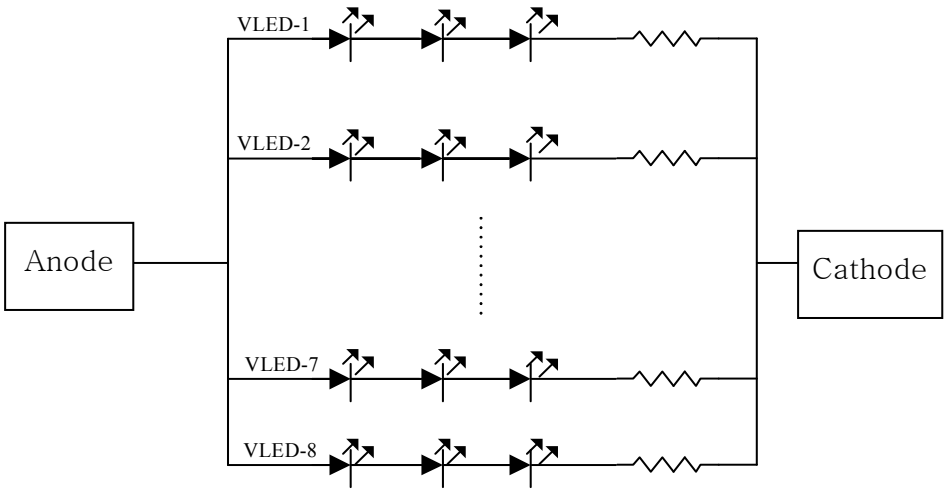
GND = 0 V， Ta = 25℃

Parameter	Symbol	Min	TYP	MAX	Unit	Remark
Supply voltage of LED backlight	V_{LED}	-	-	(11.0)	V	Note 8-1
Supply current of LED backlight	I_{LED}	-	20	-	mA	Note 8-2
Backlight Power Consumption	P_{LED}	-	-	1.76	W	Note 8-3

Note 8-1：I_{LED}=20 mA(Constant current)

Note 8-2：The LED driving condition is defined for each LED module. (3 LED Serial)
I=20 mA * 8=160 mA

Note 8-3：$P_{LED} = V_{LED-1} * I_{LED-1} + V_{LED-2} * I_{LED-2} \ \ldots\ + V_{LED-7} * I_{LED-7} + V_{LED-8} * I_{LED-8}$



Power Consumption

Ta = 25 ℃

Parameter	TYP.	MAX.	Unit	Remark
LCD Panel Power Consumption	55.0	56.07	mW	
Backlight Lamp Power Consumption	-	1.76	W	Note 8-4
Total Power Consumption	-	1.82	W	

Note 8-4：Backlight 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}	120	125	130	ns	CPH1~ CPH3
CPH pulse duty	t_{CWH}	40	50	60	%	CPH1~ CPH3
STH setup time	t_{SUH}	20	-	-	ns	STHL,STHR
STH hold time	t_{HDH}	20	-	-	ns	STHL,STHR
STH pulse width	t_{STH}	-	1	-	t_{CPH}	STHL,STHR
STH period	t_H	61.5	63.5	65.5	μs	STHL,STHR
OEH pulse width	t_{OEH}	-	1.22	-	μs	OEH
Sample and hold disable time	t_{DIS1}	-	8.28	-	μs	
OEV pulse width	t_{OEV}	-	10.8	-	μs	OE1,2,3
CKV pulse width	t_{CKV}	-	32	-	μs	CKV
Clean enable time	t_{DIS2}	-	5.4	-	μs	
Horizontal display start	t_{SH}	-	0	-		
Horizontal display timing range	t_{DH}	-	400	-	t_{CPH}	
STV setup time	t_{SUV}	400	-	-	ns	STVU,STVD
STV hold time	t_{HDV}	400	-	-	ns	STVU,STVD
STV pulse width	t_{STV}	-	-	1	t_H	STVU,STVD
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	μs	
VCOM falling time	t_{fCOM}	-	-	5	μs	
VCOM delay time	t_{DCOM}	-	-	3	μs	
RGB delay time	t_{DRGB}	-	-	1	μs	

8-5) Signal Timing Waveforms

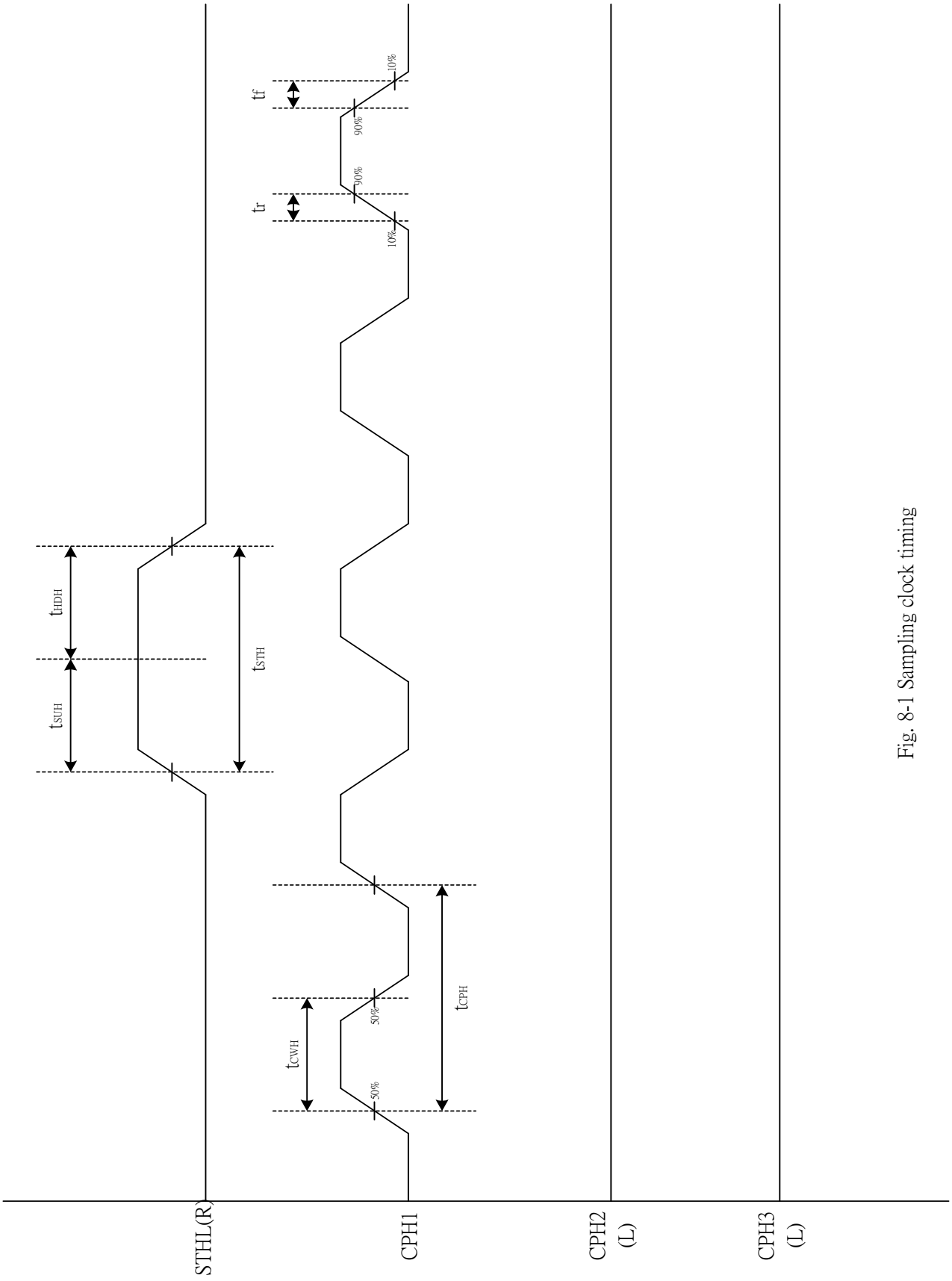


Fig. 8-1 Sampling clock timing

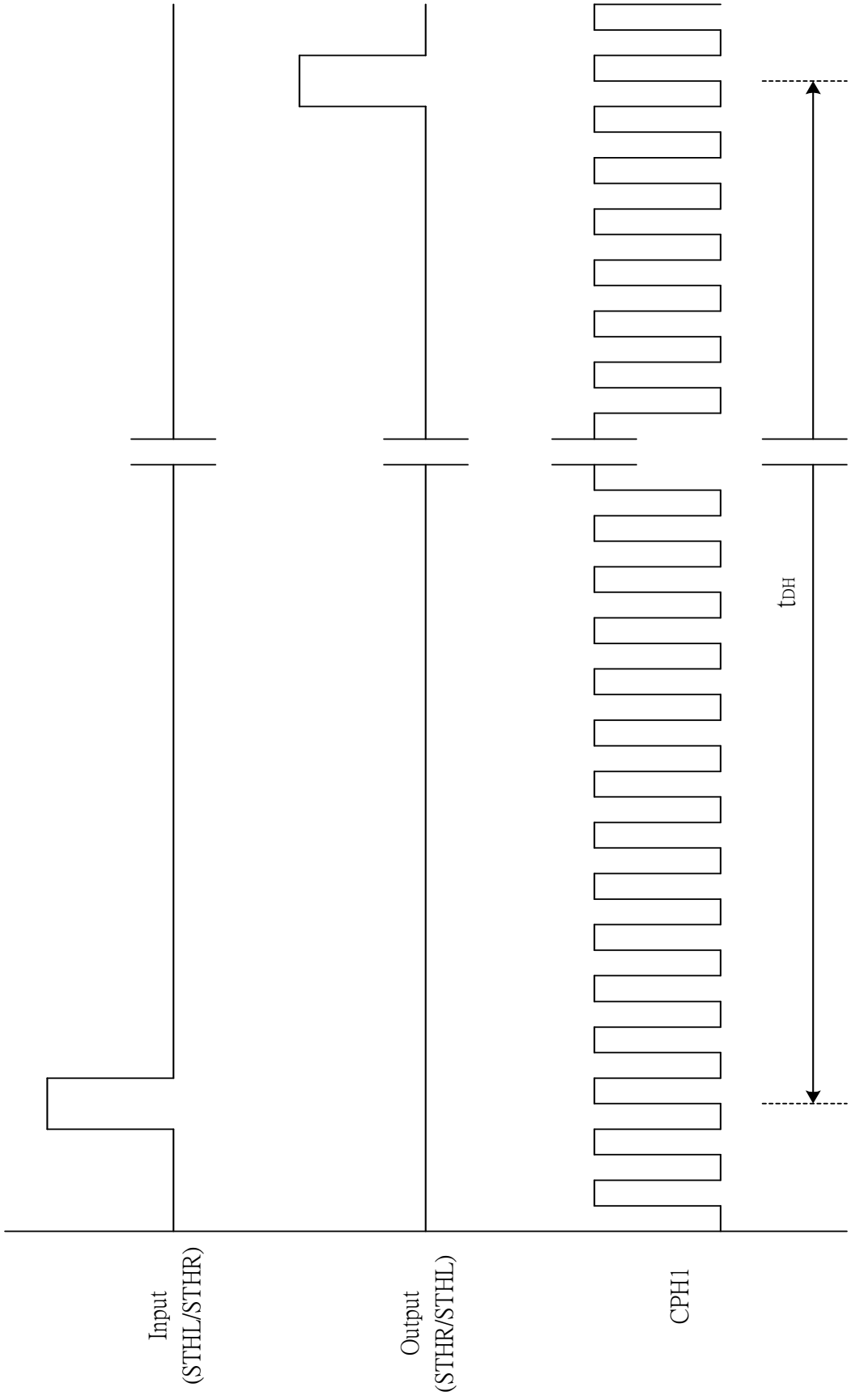


Fig. 8-2 Horizontal display timing range

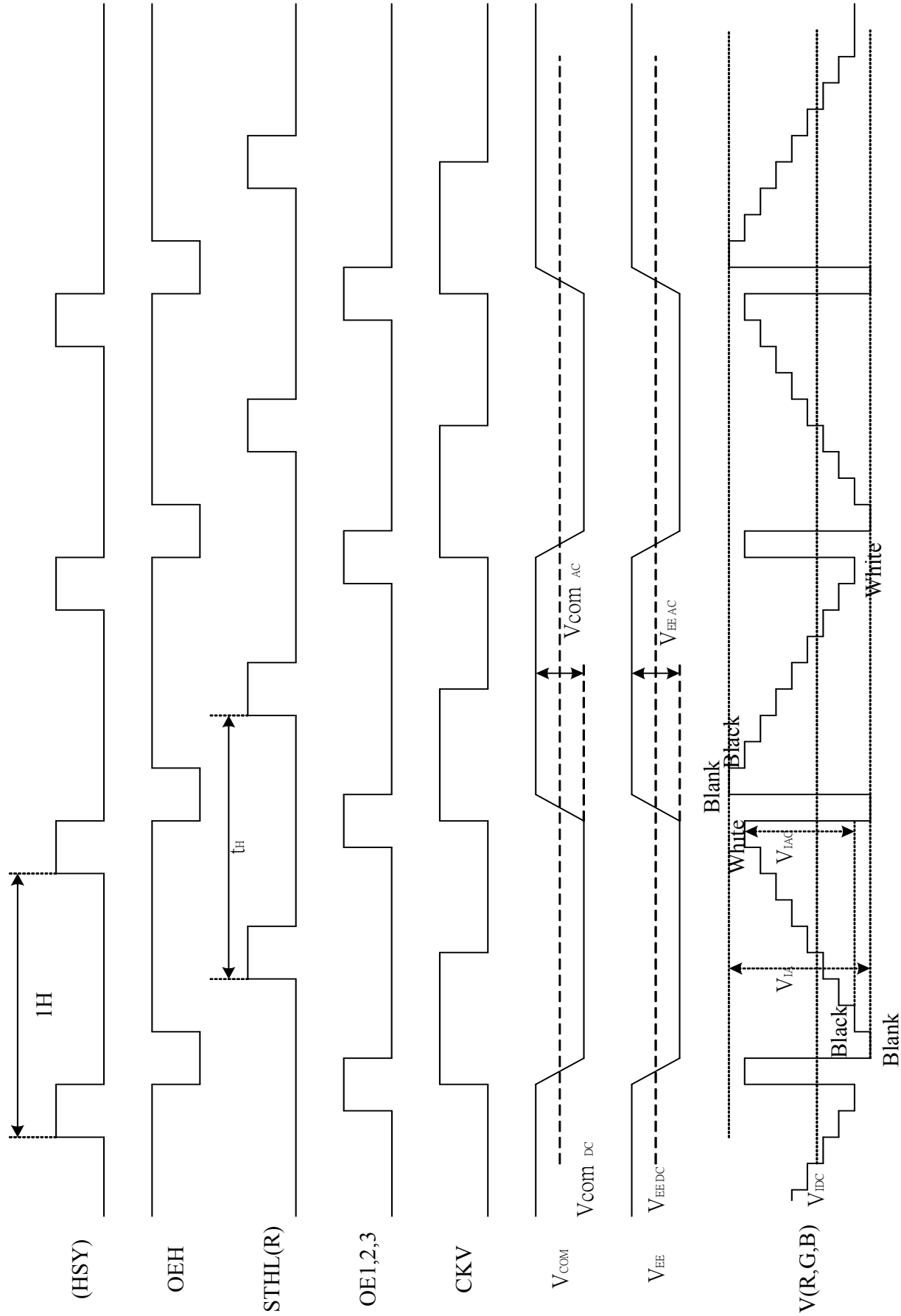
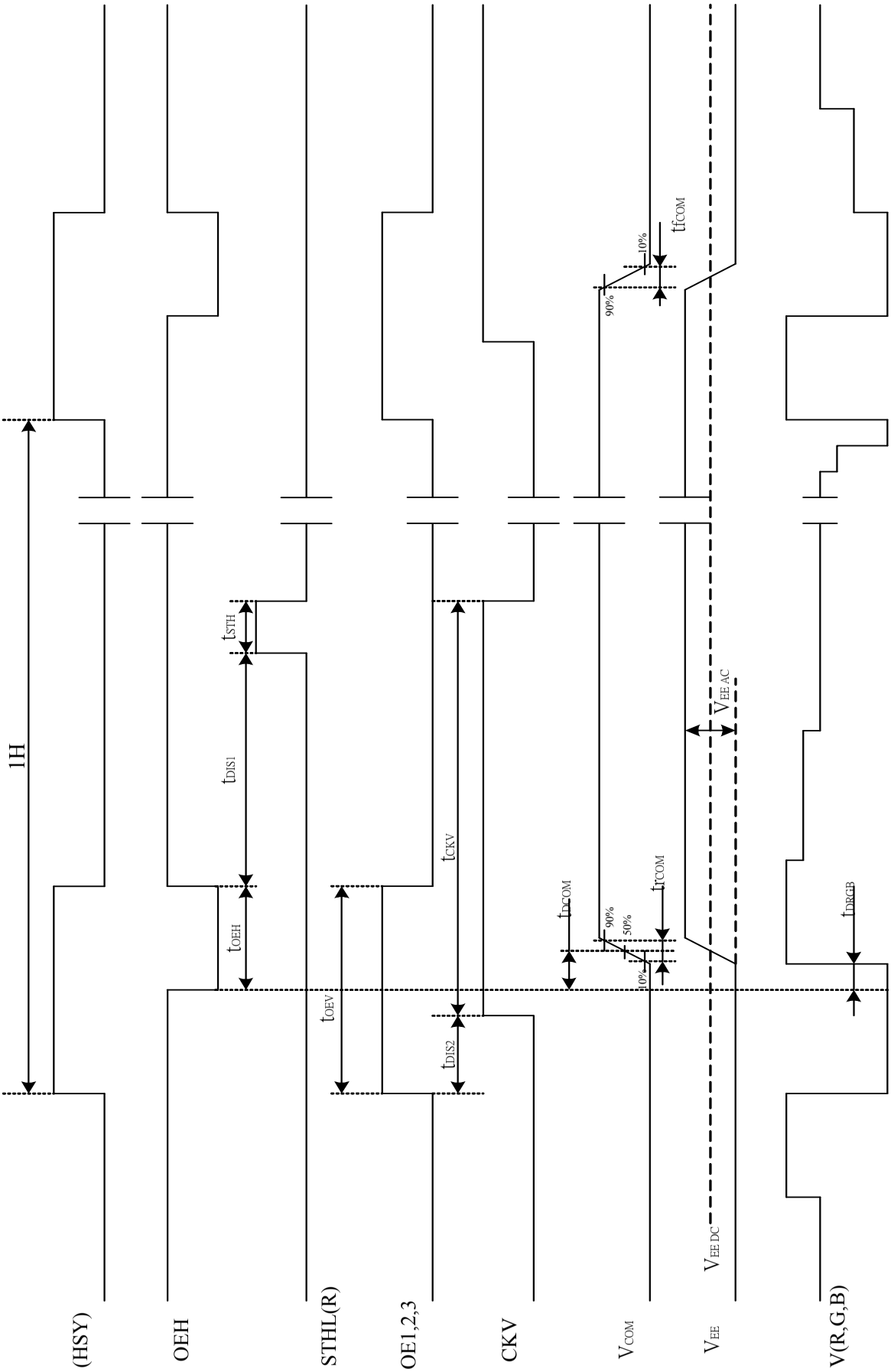


Fig. 8-3 (a) Horizontal timing



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

Fig. 8-3 (b) Detail horizontal timing

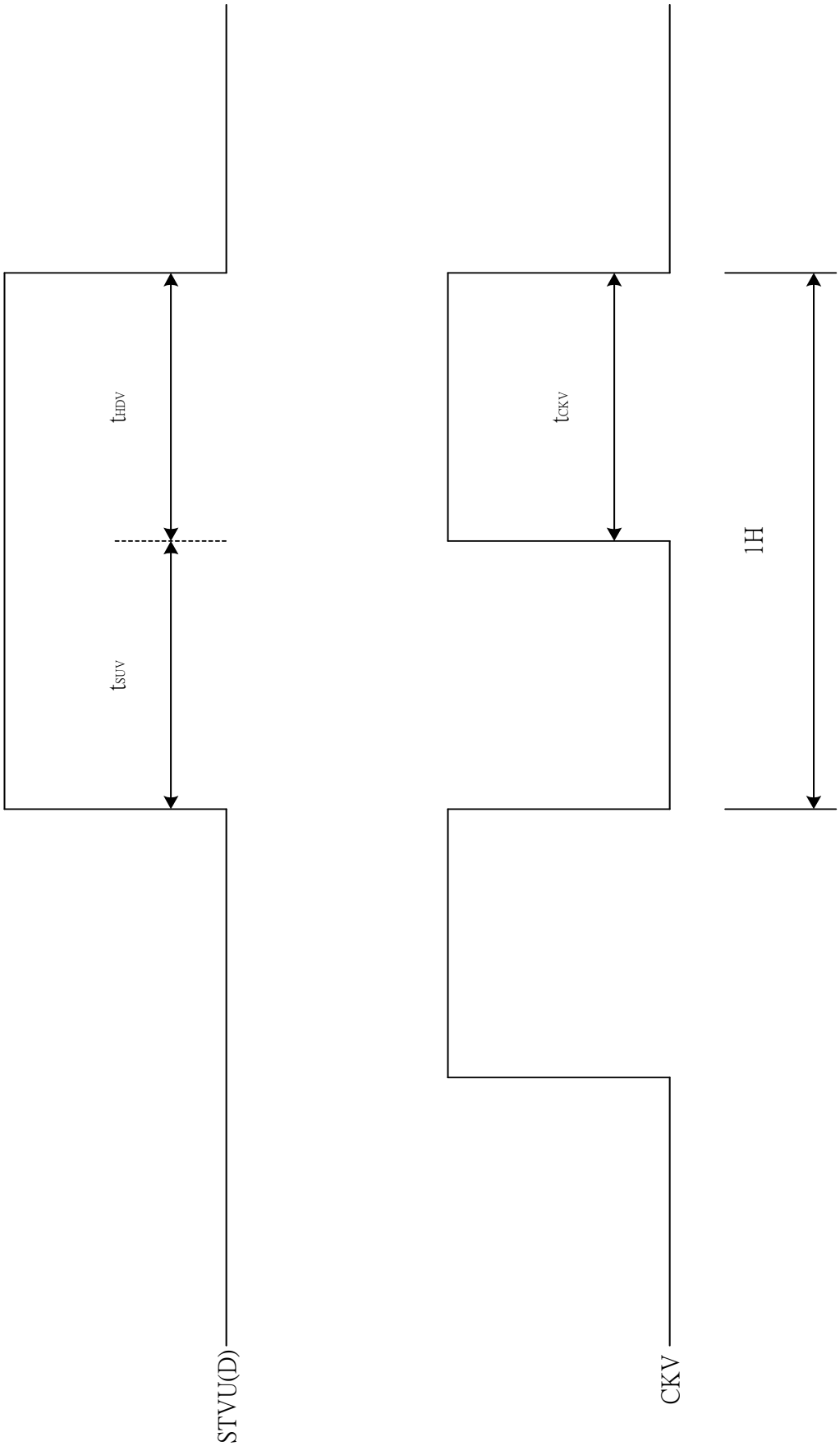


Fig. 8-4 Vertical shift clock timing

Vertical timing (From up to down)

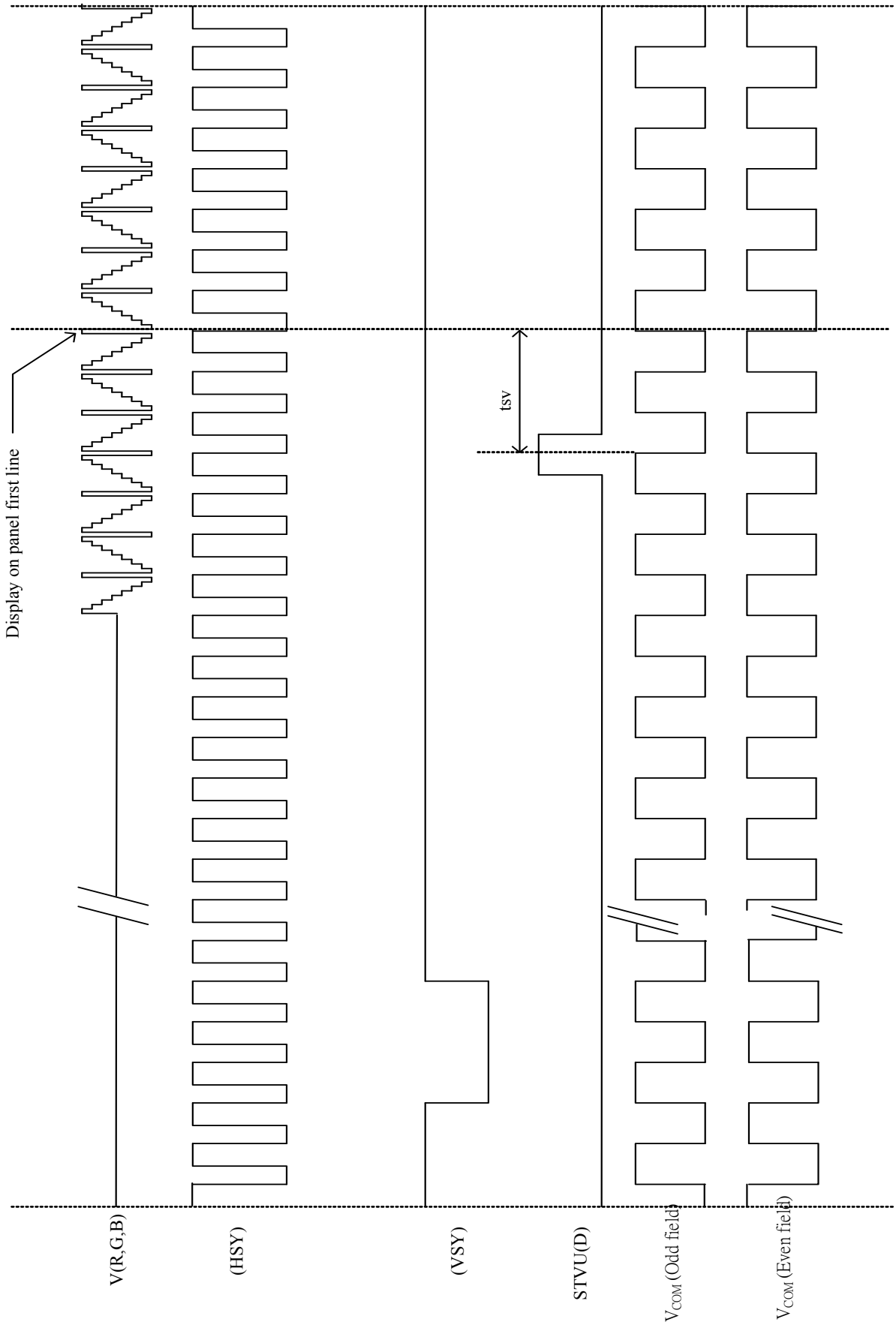


Fig. 8-5 (a) Vertical timing (From Up to Down)

Vertical timing (From down to up)

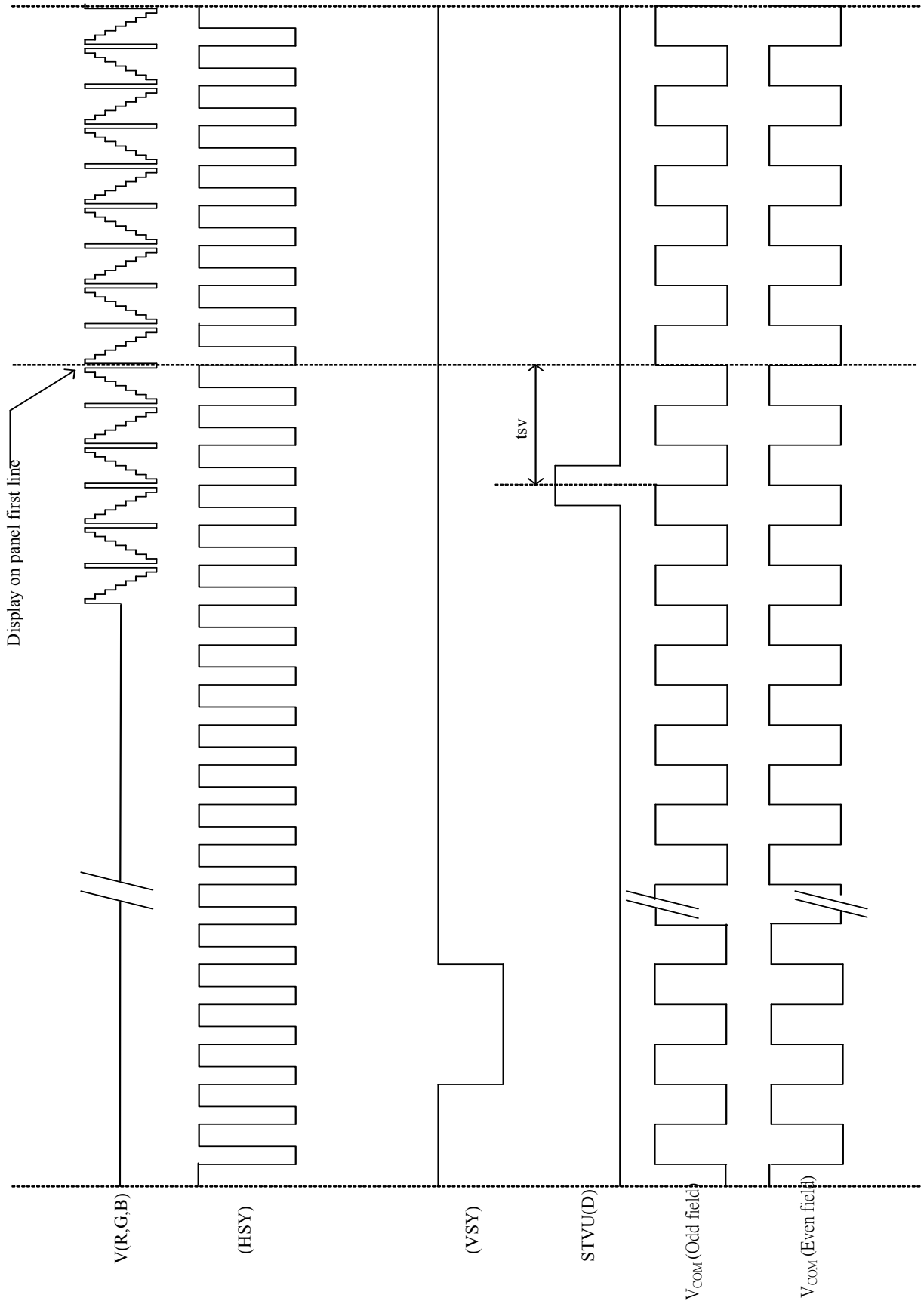
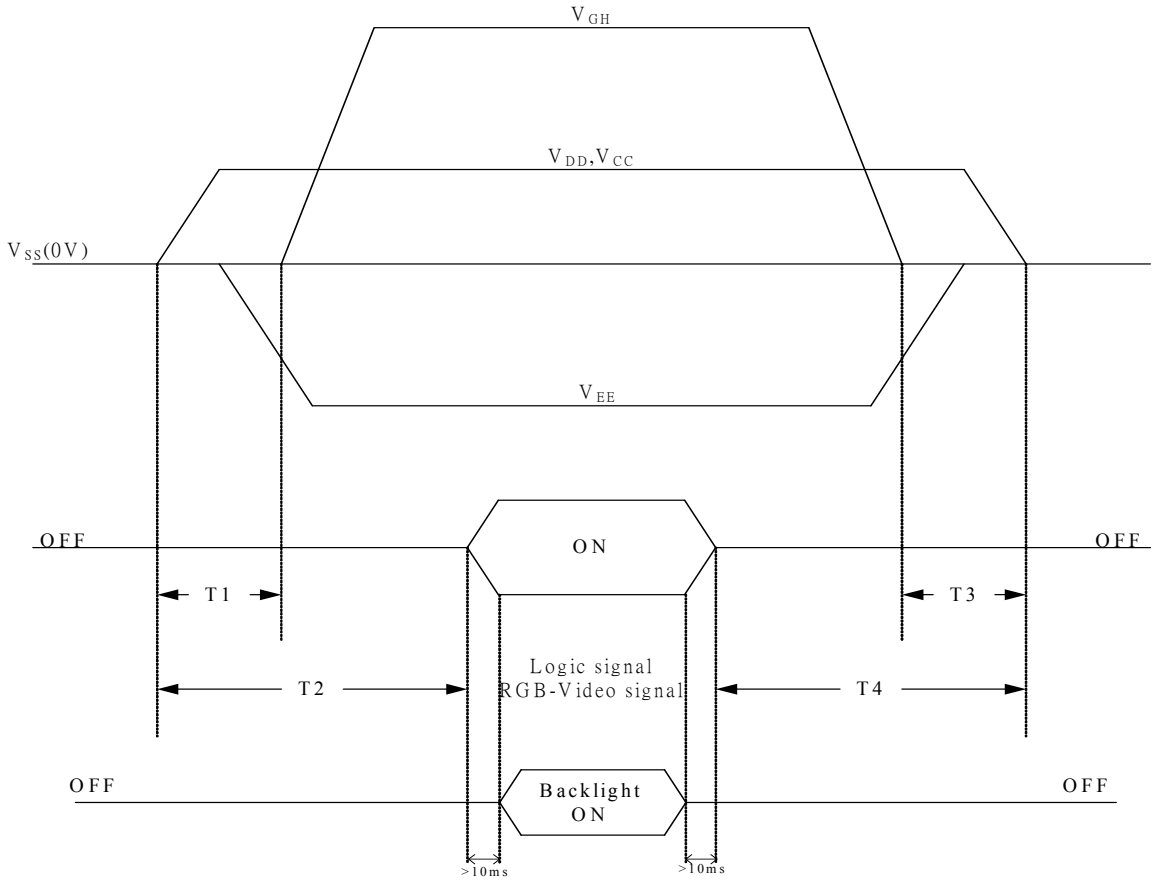


Fig. 8-5 (b) Vertical timing (From Down to Up)

9. Power On Sequence



1) 10ms≦T1<T2
2) 0ms<T3≦T4≦10ms

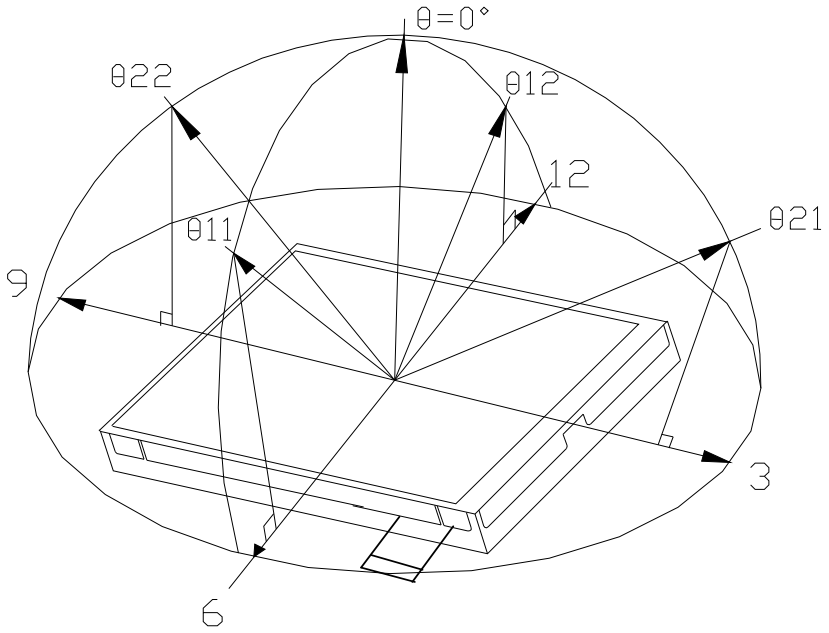
10. Optical Characteristics

10-1) Specification:

Ta = 25℃

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ21, θ22	CR≧10	55	60	-	deg	Note 10-1
	Vertical	θ12		35	40	-	deg	
		θ11		50	55	-	deg	
Contrast Ratio		CR	At optimized Viewing angle	200	350	-	-	Note 10-2
Response time	Rise	Tr	θ=0°	-	15	30	ms	Note 10-4
	Fall	Tf		-	25	50	ms	
Brightness		L	θ=0°	350	400	-	cd/㎡	Note 10-3
Uniformity		U	9-point	70	75	-	%	Note 10-5
White Chromaticity		x	θ=0°	0.28	0.31	0.34	-	Note 10-3
		y		0.31	0.34	0.37	-	
LED Life Time		-	+25℃	20000	30000	-	hr	Note 10-6

Note 10-1 : The definitions of viewing angles



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

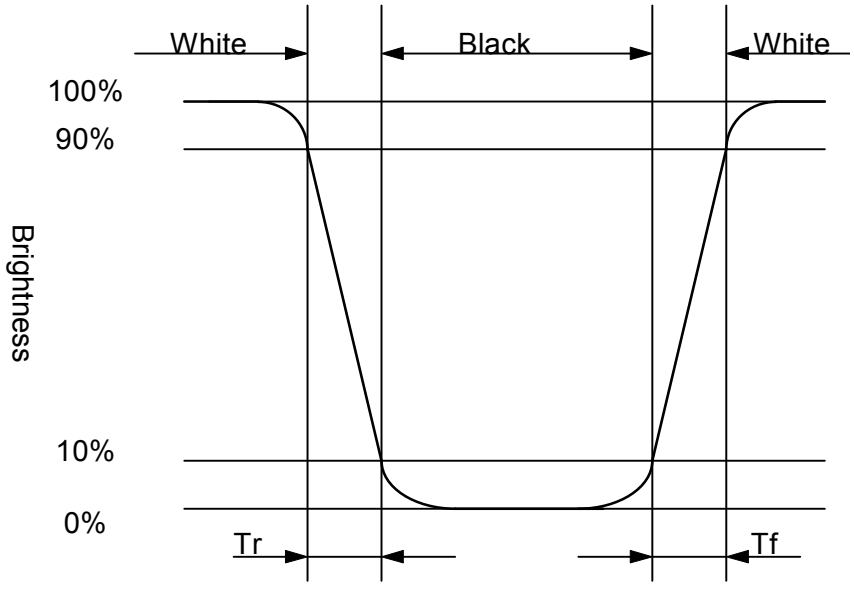
(Testing configuration see 10-2)

Contrast Ratio is measured in optimum common electrode voltage.

Note 10-3 : 1. Topcon BM-7(fast) luminance meter 1°field of view is used in the testing (after 20 minutes operation).

2. LED Current 20mA

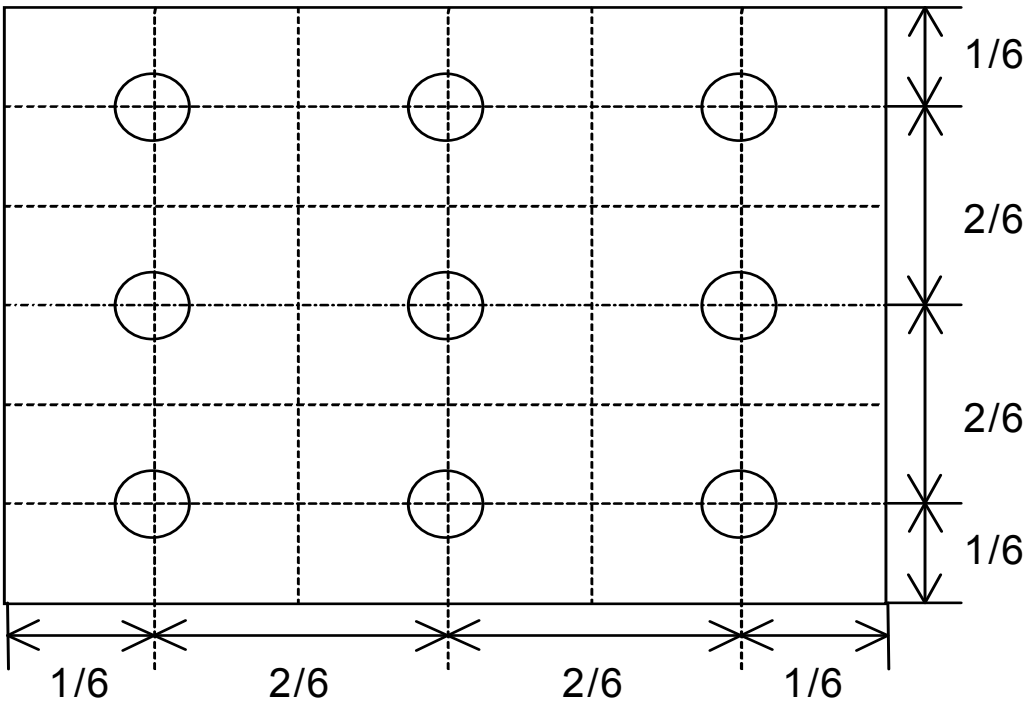
Note 10-4 : The definition of response time :



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

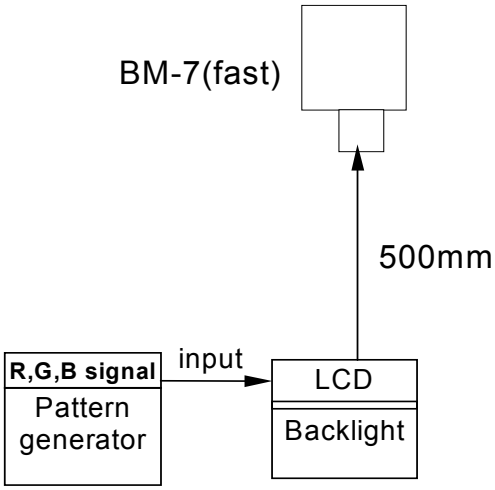
$$U = \frac{\text{The Minimum Brightness of the 9 testing Points}}{\text{The Maximum Brightness of the 9 testing Points}}$$

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).



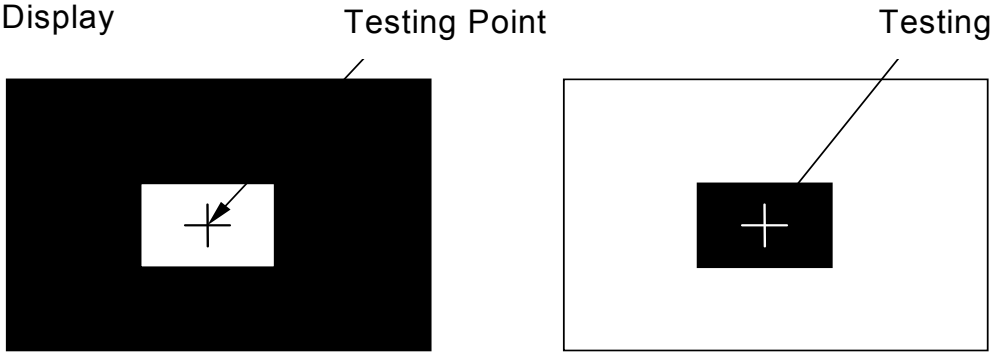
Note 10-6: The “LED Life time “ is defined as the module brightness decrease to 50% original Brightness that the ambient temperature is 25℃ and I_{LED} =20mA.

10-2) Testing configuration



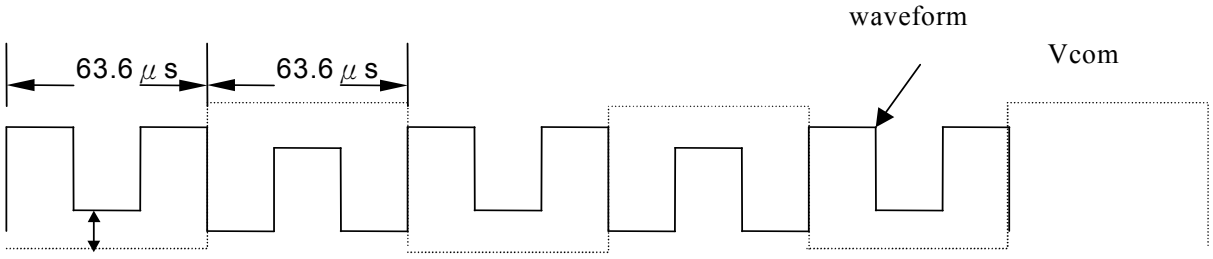
Caution: 1. Environmental illumination ≦ 1 lux
2. Before test CR, Vcom voltage must be adjusted carefully to get the best CR.

- LCD Display



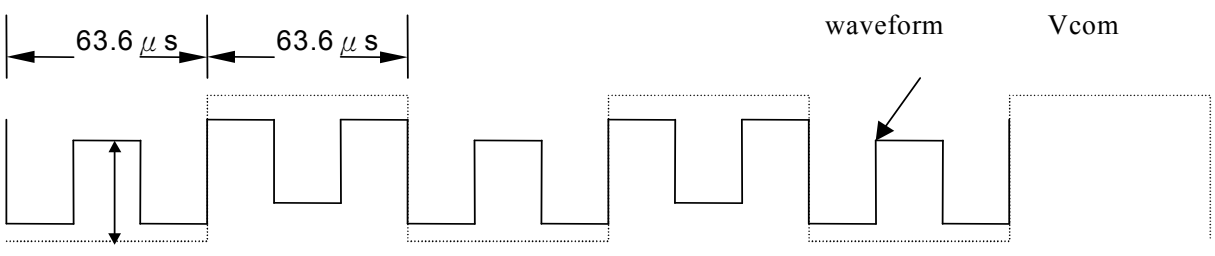
Pattern A Pattern B

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



Vw=1.3V +/- 0.2V

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



Vb=5.0V +/- 0.2V

11. Handling Cautions

11-1) Mounting of module

a) Please power off the module when you connect the input/output connector.
b) Polarizer which is made of soft material and susceptible to flaw must be handled carefully.
c) Protective film (Laminator) is applied on surface to protect it against scratches and dirts. 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.
b) Wipe off water drops or finger grease immediately. Long contact with water may cause discoloration or spots.
c) 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) Adjusting module

a) Adjusting volumes on the rear face of the module have been set optimally before shipment.
b) Therefore, do not change any adjusted values. If adjusted values are changed, the specifications described may not be satisfied.

11-4) 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.
c) 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.
f) Please adjust the voltage of common electrode as material of attachment by 1 module.

12. Reliability Test

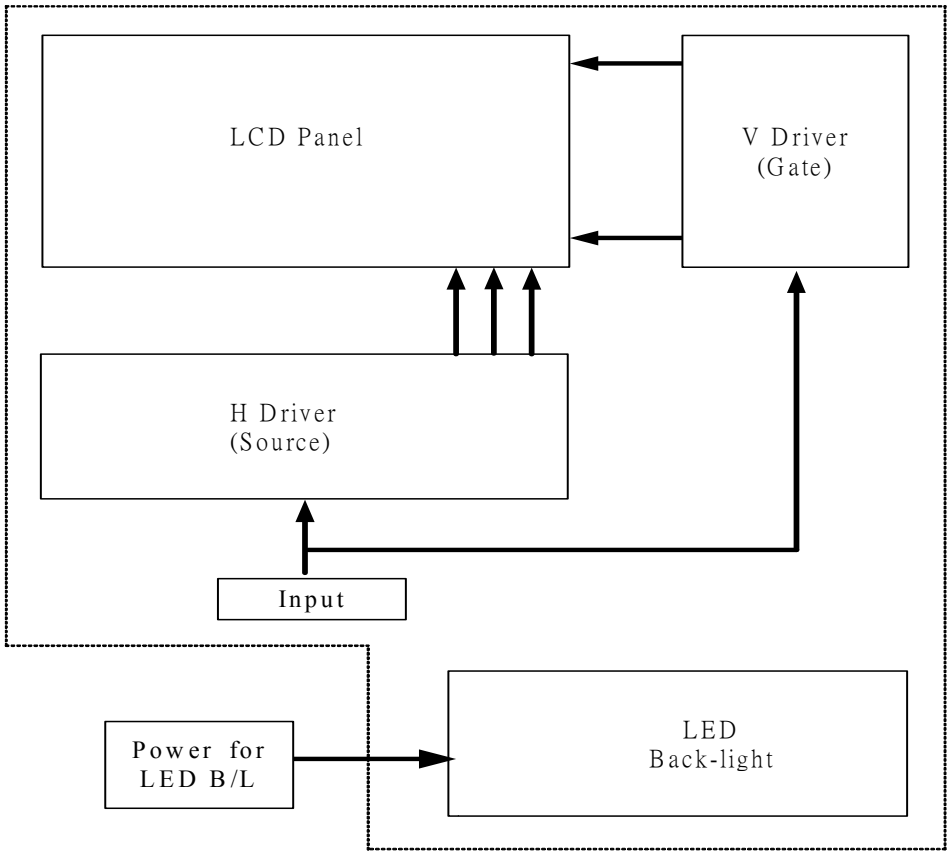
No	Test Item	Test Condition
1	High Temperature Storage Test	Ta = +85℃, 240 hrs
2	Low Temperature Storage Test	Ta = -40℃, 240 hrs
3	High Temperature Operation Test	Ta = +85℃, 240 hrs
4	Low Temperature Operation Test	Ta = -30℃, 240 hrs
5	High Temperature & High Humidity Operation Test	Ta = 60℃, 90%RH, 240 hrs
6	Thermal Cycling Test (non-operating)	-30℃→ 80℃, 200 Cycles 30 min 30 min
7	Vibration Test (non-operating)	Frequency：10 ~ 55 H_Z Amplitude：1.5 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]

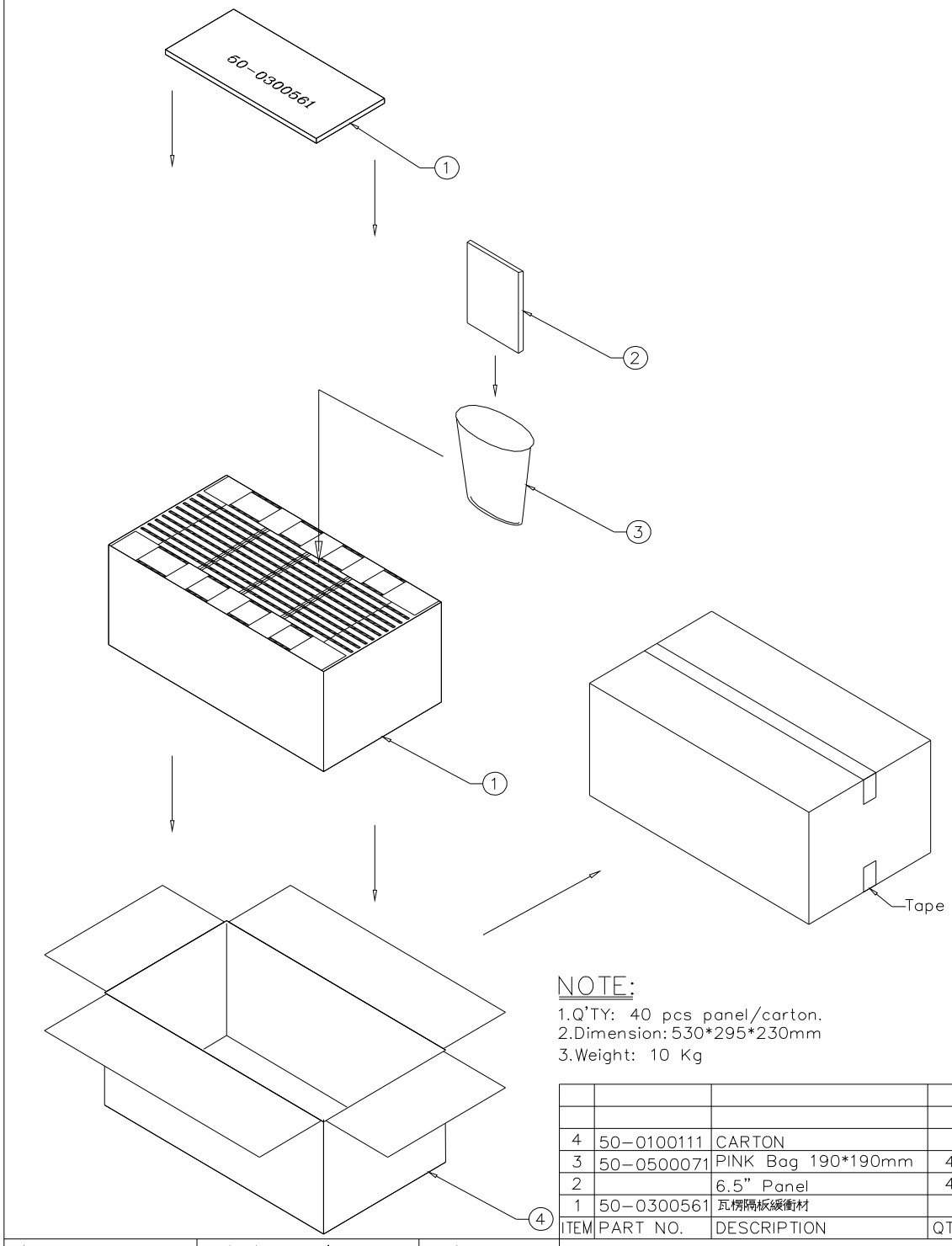
In the standard conditions, there is not display function NG issue occurred. (including : line defect ,no image). All the cosmetic specification is judged before the reliability stress.

13. Block Diagram



14. 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 Kg

ITEM	PART NO.	DESCRIPTION	QTY	REMARK
4	50-0100111	CARTON	1	
3	50-0500071	PINK Bag 190*190mm	40	抗靜電
2		6.5" Panel	40	
1	50-0300561	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.

			SCALE	UNIT	SHEET	DWG.TITLE
APPROVE	Franks	'06.03.31			1 OF 1	6.5" Model Packing Draw
CHECK	Franks	'06.03.31				
DRAWN	Jimmyc	'06.03.31	MTL.NO.		DWG FILE:	REV. 01 / A4 SIZE