Version : 5.0

TECHNICAL SPECIFICATION

MODEL NO : PA025XSC

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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 李穎銘

Revision History

Rev.	Issued Date	Revised Contents
1.0	Aug.13, 2004	New
1.1	Jan.11, 2005	Removed Page 25:Indication of Lot Number Label Add Page 25: Reliability Test (Note:The protective film must be removed before temperature test)
1.2	Jun.07, 2005	Modify: Page03: Weight tolerance change to 18±2 Page25:Packing – change tray & cushion
1.3	Dec.22, 2005	1.Page 3: Outline Dimension Add FPC PI Tape outline . 2.Page 5 : 5.Input / Output Terminals Modify FPC pin No.23 Form V_{EE} to N/C (No connection) 3.Page 25. 12. Reliability Test Add High Temperature Operation Test=60℃,240hrs
5.0	Nov 12 , 2007	Page 27 14. Packing Delete carton packing

TECHNICAL SPECIFICATION

CONTENTS

1. Application

This technical specification applies to 2.5" color TFT-LCD panel. The 2.5” color TFT LCD panel is designed for camcorder, digital camera application and other electronic products which require high quality flat panel displays.

2. Features

.Amorphous silicon TFT-LCD panel with LED backlight unit

. Compatible with NTSC & PAL system

.High Resolution : 112,320 Dots

. Slim and compact

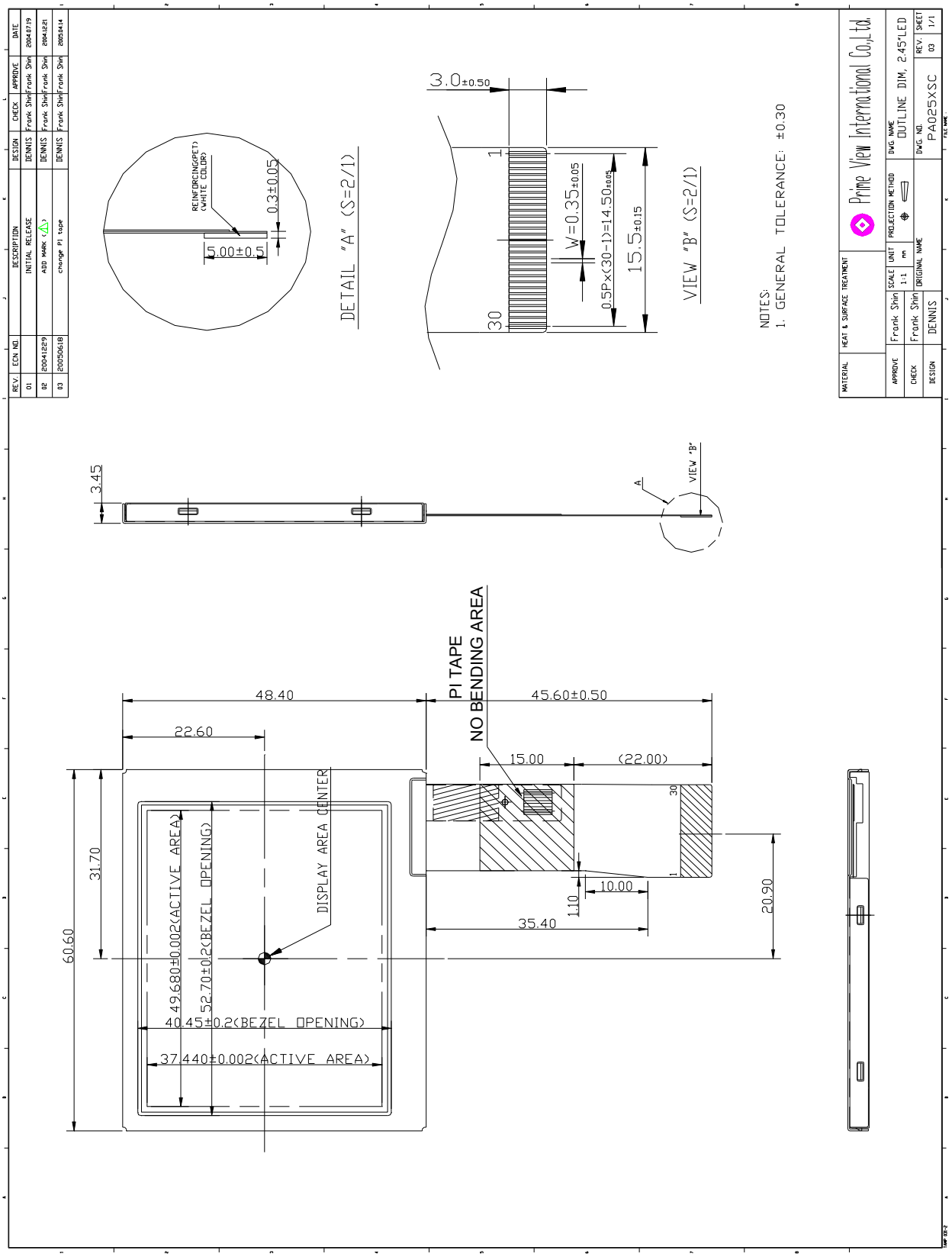
.Optimum Viewing Direction: 6 o’clock

. Up/Down and Left/Right Image Reversion

3. Mechanical Specifications

Parameter	Specifications	Unit
Screen Size	2.45(diagonal)	inch
Surface Treatment	Anti - Glare	
Display Format	160×(R,G,B)×234	dot
Active Area	49.68(H) × 37.44(V)	mm
Pixel Pitch	0.310(H) × 0.160(V)	mm
Pixel configuration	Delta	
Outline Dimension	60.6(W)×48.4 (H)×3.45 (D)(typ.)	mm
Back-light	4-LED	-
Weight	18±2	g
Display mode	Normally white	
Gray scale inversion direction	6 (Note 10-1)	o’clock

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	STH1	I/O	Start pulse for source driver	Note5-6
2	AV_{SS}	I	Analog GND for source driver	
3	AV_{DD}	I	Analog power input for source driver	Note5-3
4	V_B	I	Video Input B	Note5-1
5	V_G	I	Video Input G	
6	V_R	I	Video Input R	
7	V_{SS}	I	Digital GND	
8	V_{DD}	I	Digital power input	Note5-3
9	CPH1	I	Sampling and shift clock for source driver	
10	CPH2	I	Sampling and shift clock for source driver	
11	CPH3	I	Sampling and shift clock for source driver	
12	STH2	I/O	Start pulse for source driver	Note5-6
13	Q2H	I	Video input rotation control	
14	INH	I	Output enable for source driver	
15	R/L	I	Left/Right Control for source driver	Note5-6
16	V_{COM}	I	Common electrode voltage	Note5-1
17	XOE	I	Output enable for gate driver	
18	CPV	I	Clock input for gate driver	
19	U/D	I	Up/Down Control for gate driver	Note5-6
20	DIO2	I/O	Vertical start pulse	Note5-6
21	DIO1	I/O	Vertical start pulse	
22	V_{GL}	I	Gate off voltage(alternative every 1-H)	Note5-2
23	NC	-	No connection	
24	V_{SS}	I	GND	
25	V_{CC}	I	Logic power for gate driver	Note5-3
26	V_{GH}	I	Gate on voltage	Note5-4
27	NC	-	No connection	
28	NC	-	No connection	
29	GLED	I	Ground for LED backlight	
30	VLED	I	Supply voltage for LED backlight	Note5-5

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.

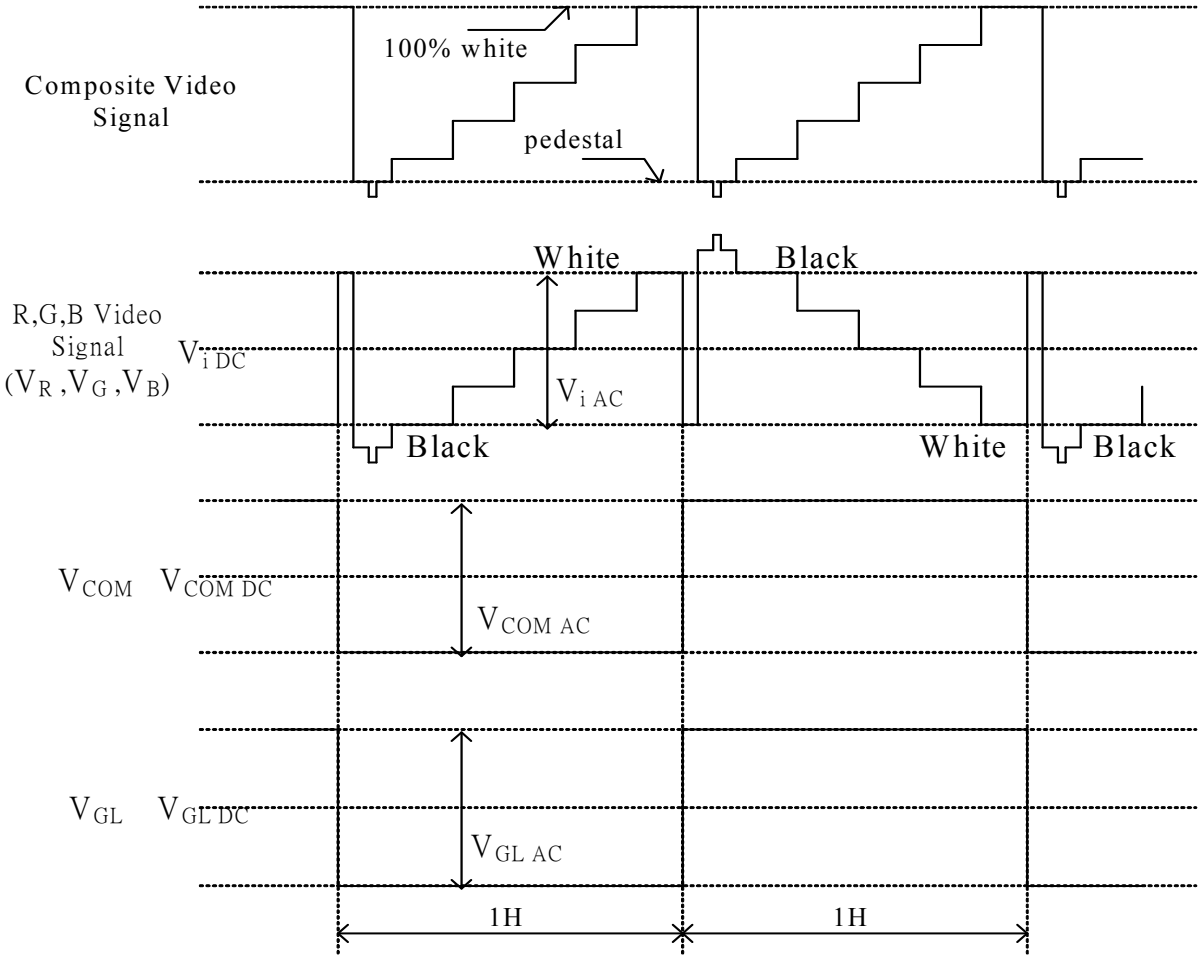


Fig.1

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 : $V_{GL\ (TYP.)} = -12V$

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

Note 5 – 4 : $V_{GH(TYP.)} = +15V$

Note 5 – 5 : $V_{LED} = 20mA$

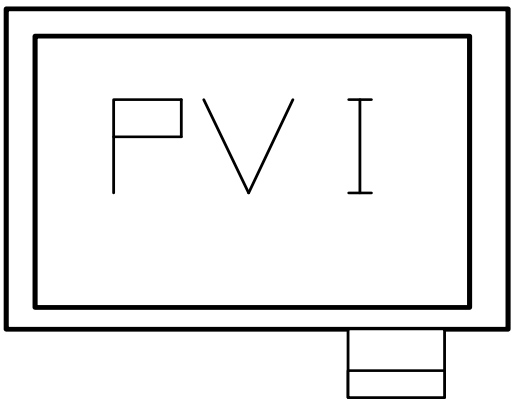
Note 5 – 6 : STH1, STH2 and R/L mode

R/L	STH1	STH2	Remark
High(V_{DD})	Input	Output	Left to Right
Low(0 Volt.)	Output	Input	Right to Left

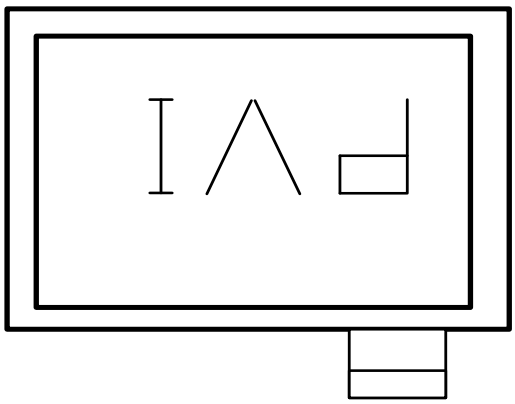
DIO1,DIO2,and U/D mode

U/D	DIO1	DIO2	Remark
High(V_{CC})	Input	Output	Down to Up
Low(0 Volt.)	Output	Input	Up to Down

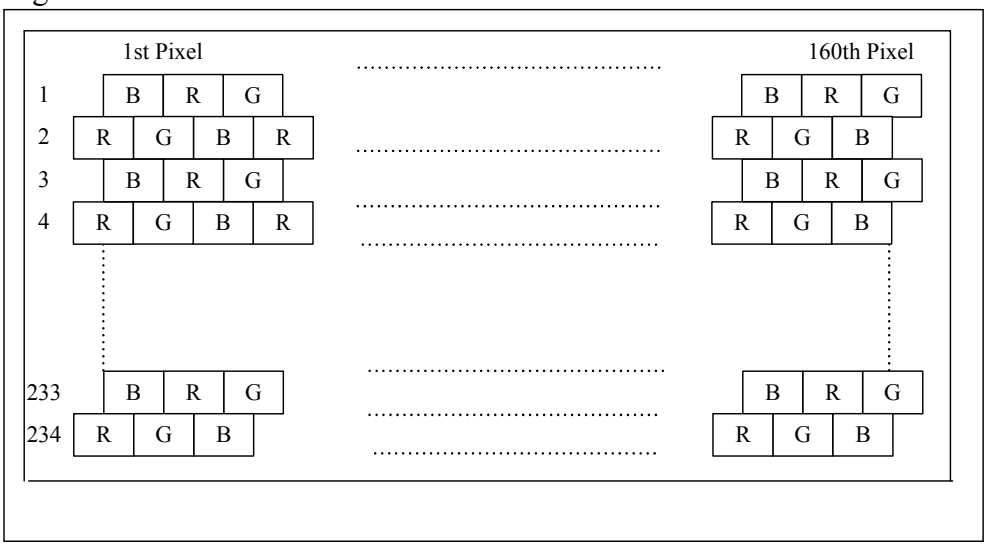
U/D(PIN 19)=High R/L(PIN 15)=Low



U/D(PIN 19)=Low R/L(PIN 15)=High



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		AV_{DD}	-0.3	+7.0	V	
		V_{DD}	-0.3	+7.0	V	
Supply Voltage For Gate Driver		V_{CC}	-0.3	+7.0	V	
		V_{GH}-V_{GL}	+15	+40	V	
	H Level	V_{GH}	-0.3	+45	V	
	L Level	V_{GL}	-23	+0.3	V	

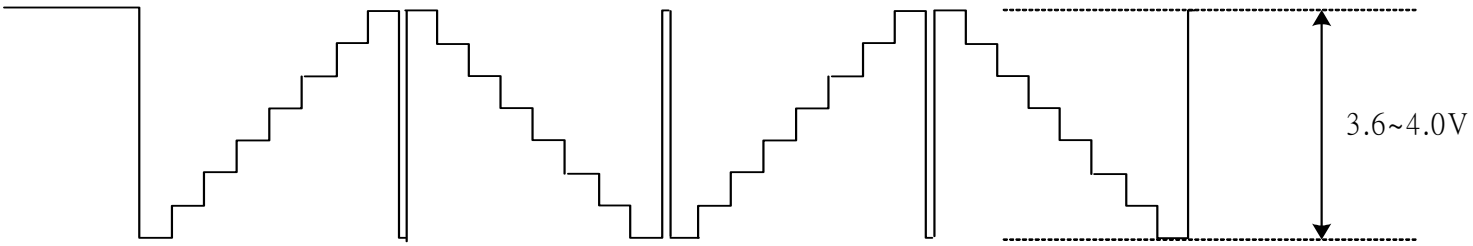
8. Electrical Characteristics

8-1) Operating Condition

Parameter		Symbol	MIN.	Typ.	MAX.	Unit	Remark
Supply Voltage For Source Driver	Analog	AV_{DD}	+4.5	+5.0	+5.5	V	
	Logic	V_{DD}	+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}		+14.5	+15.0	+15.5	V	
	$V_{GL\ DC}$		-12.5	-11.0	-9.5	V	DC Component of V_{GL}
	$V_{GL\ AC}$		-	+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 (VR , VG , VB)	V_{IAC}		-	+3.6	+4.0	V	Note 8-2
	V_{IDC}		-	+2.5	-	V	
Digital input voltage	H level	V_{IH}	+0.7Vcc	-	Vcc	V	
	L level	V_{IL}	0	-	0.3Vcc	V	
Digital output voltage	H level	V_{OH}	Vcc-0.4	-	Vcc	V	
	L level	V_{OL}	0	-	0.4	V	
V_{COM}		$V_{COM\ AC}$	-	6.0	-	V_{P-P}	AC Component of V_{COM}
		$V_{COM\ DC}$	-	1.0	-	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 1.0V±1V,every module's $V_{COM\ DC}$ level shall be carefully adjusted to show a best image performance.

Note 8-2: Both NTSC and PAL system Video Signal input waveform is based on 8 steps gray scale.



8-2) Current Consumption

Ta = 25℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage of LED backlight	V_{LED}	-	-	(11.0)	V	Note 8-4
Supply current of LED backlight	I_{LED}	-	20	-	mA	Note 8-5
Backlight Power Consumption	P_{LED}	-	-	0.22	W	Note 8-6

Note 8-4 : I_{LED} = 20mA(Constant Current).

Note 8-5: The LED driving condition is defined for each LED module. (4 LED Serial)
Input current = 20mA * 1 = 20mA

Note 8-6: $P_{LED}=V_{LED}* I_{LED}$

8-3) Backlight driving & Power Consumption

Ta= 25 ℃

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Current for Driver	I_{GH}	V_{GH}=+15V	-	0.1	0.2	mA	
	I_{GL}	V_{GL}=-12V	-	0.36	0.9	mA	V_{GL} center voltage
	I_{CC}	V_{CC}=+3.3V	-	0.2	0.4	mA	
	AI_{DD}	AV_{DD}=+5V	-	3.5	5.0	mA	
	I_{DD}	V_{DD}=+5V	-	0.6	1.5	mA	
LCD Panel Power Consumption	-	-	-	31.82	57.30	mW	
Backlight power Consumption	P_{LED}	-	-	-	0.22	W	
Total power Consumption	-	-	-	-	0.28	W	

8-4) Input / Output Connector
LCD Module Connector
FFC Down Connector, 30 Pins
Pitch：0.5 mm

8-5) Timing Characteristics Of Input Signals

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Remark
1Field Scanning Period	t1V	-	262.5	-	H	
1Line Scanning Period	t1H	-	63.5	-	μs	
Source Driver Operating Frequency	fhc	1.0	3.14	5.0	MHz	
Signal Sampling Pulse Width	tchw	200	317.7	1000	ns	
Signal Sampling Pulse Delay	tchd	95.3	105.9	116.5	ns	tchd 12,23
Signal Sampling Pulse Width(H)	tchwh	142.9	158.8	174.7	ns	
Signal Sampling Pulse Delay(L)	tchwl	142.9	158.8	174.7	ns	
Source Start Signal Pulse Width	tshw	90	317.7	630*	ns	*tshset=tshhld
Source Start Signal Setup Time	tshset	20	158.8	-	ns	
Source Start Signal Hold Time	tshhld	20	158.8	-	ns	
Source Output Enable Pulse Width	tohw	1.0	2.0	-	μs	
Source Start Signal Rising Time	tss	-	9.8	-	μs	
Video Input Signal Start Point	tvs	-	10.0	-	μs	
Phase Difference Between OEH&CPV	toc	1.5	2.3	-	μs	
Gate Clock Period	tcvw	10	63.5	-	μs	
Gate Clock Pulse Width(H)	tcvwh	10	31.7	48	μs	
Gate Clock Pulse Width(L)	tcvwl	10	31.7	48	μs	
Gate Start Signal Pulse Width	tsvw	5	63.5	126**	μs	**tsvset=tsvhld
Gate Start Signal Setup Time	tsvset	5	53.2	-	μs	
Gate Start Signal Hold Time	tsvhld	5	10.3	-	μs	
Phase Difference Between OEH&STH	tosp	-	4	-	μs	
Phase Difference Between SYNC&OEH	tohs	-	1.4	-	μs	
Gate Output Enable Pulse Width	toev	-	2.5	-	μs	
V_{COM} Delay Time	t_{DCOM}	-	-	3	μs	
RGB Delay Time	t_{DRGB}	-	-	2	μs	
Vertical Display Start	tsv	-	3	-	tH	

8-6) Signal Timing Waveforms

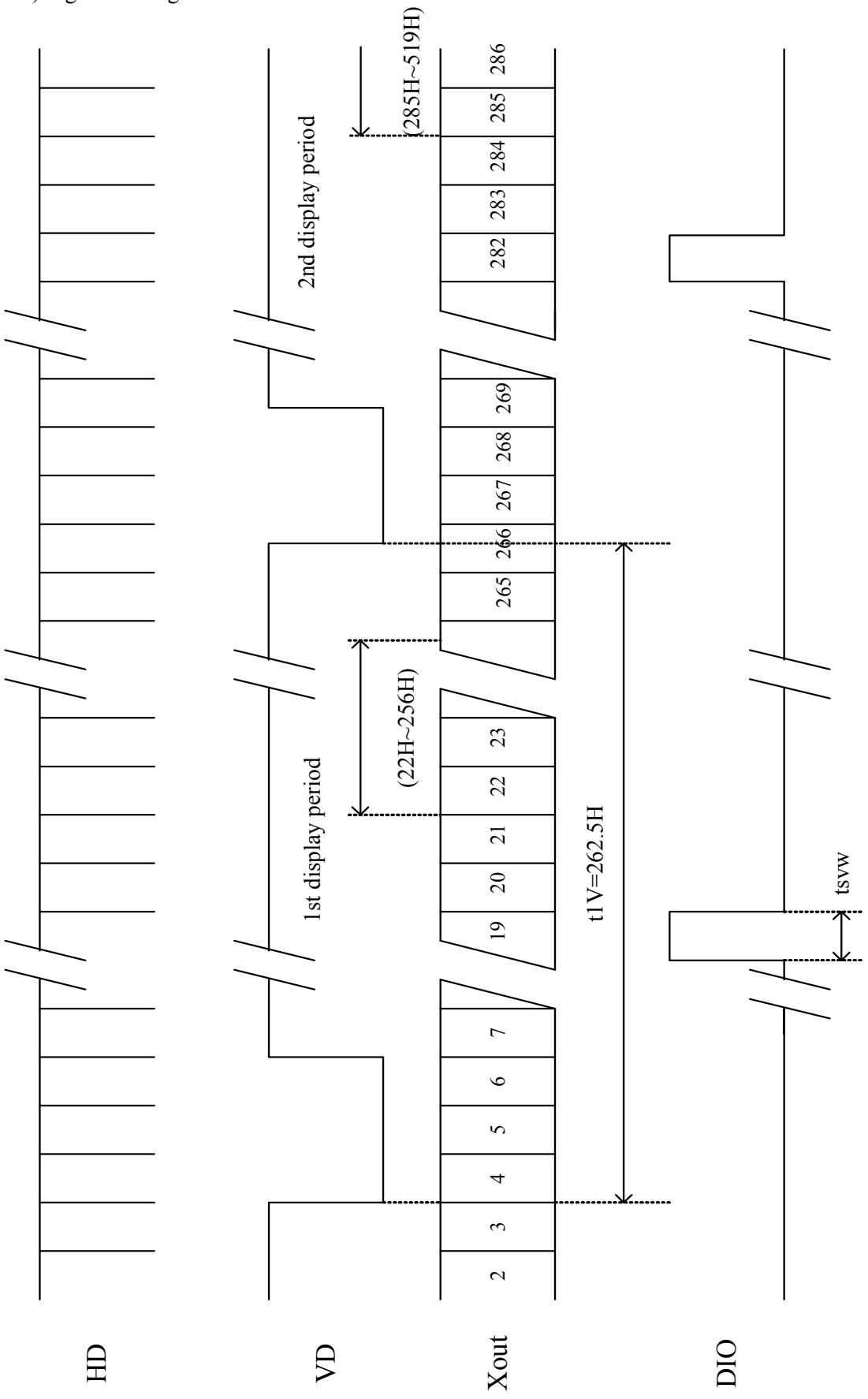
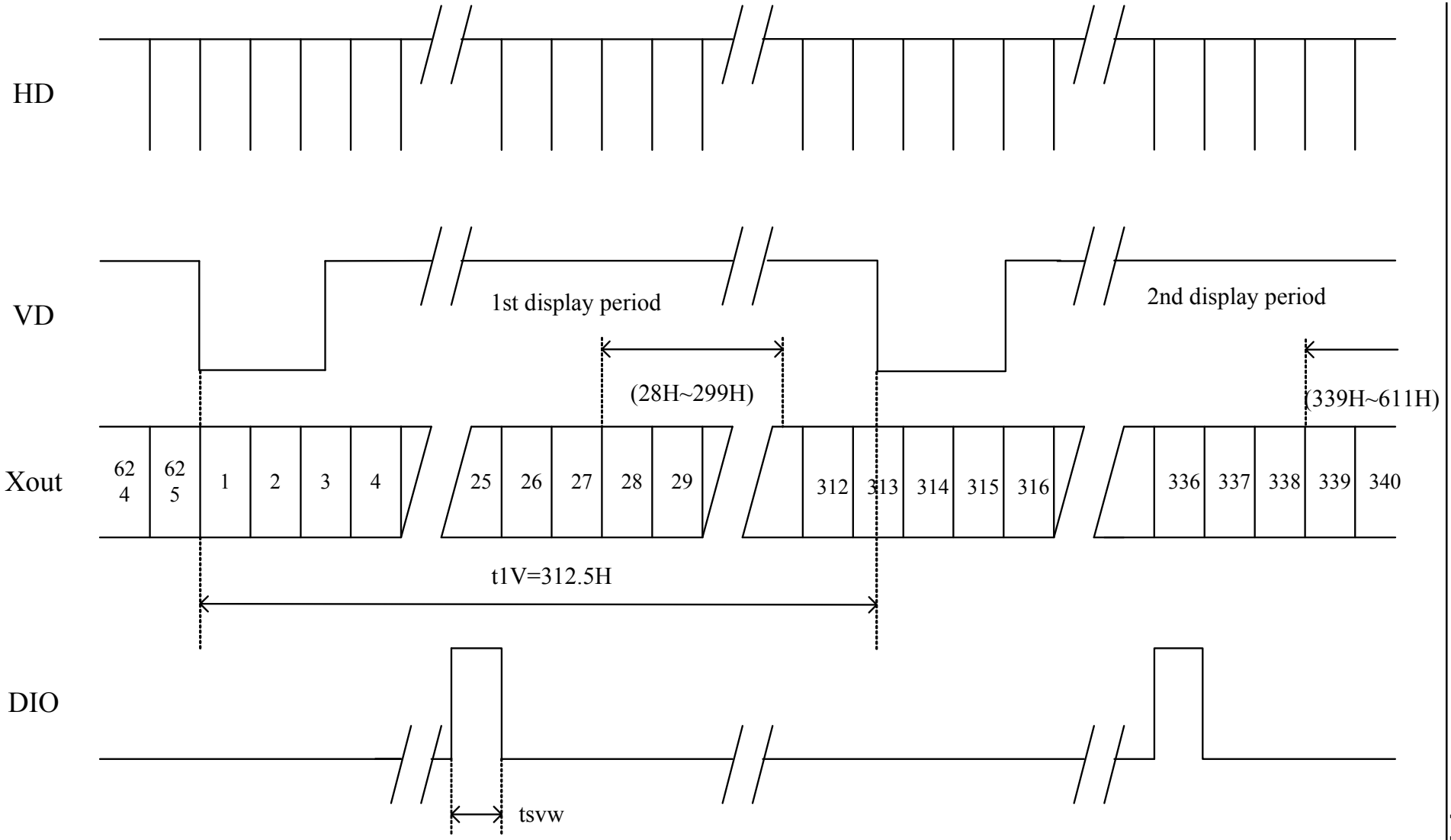


Fig. 8-1 Vertical Start Line for NTSC



** odd field : Scan lines 14n+6 14n+12 (n = 2, 3, 4..) are not displayed.
even field : Scan lines 14n+12 14n+20 (n = 2, 3, 4..) are not displayed.

Fig. 8-2 Vertical Start Line for PAL

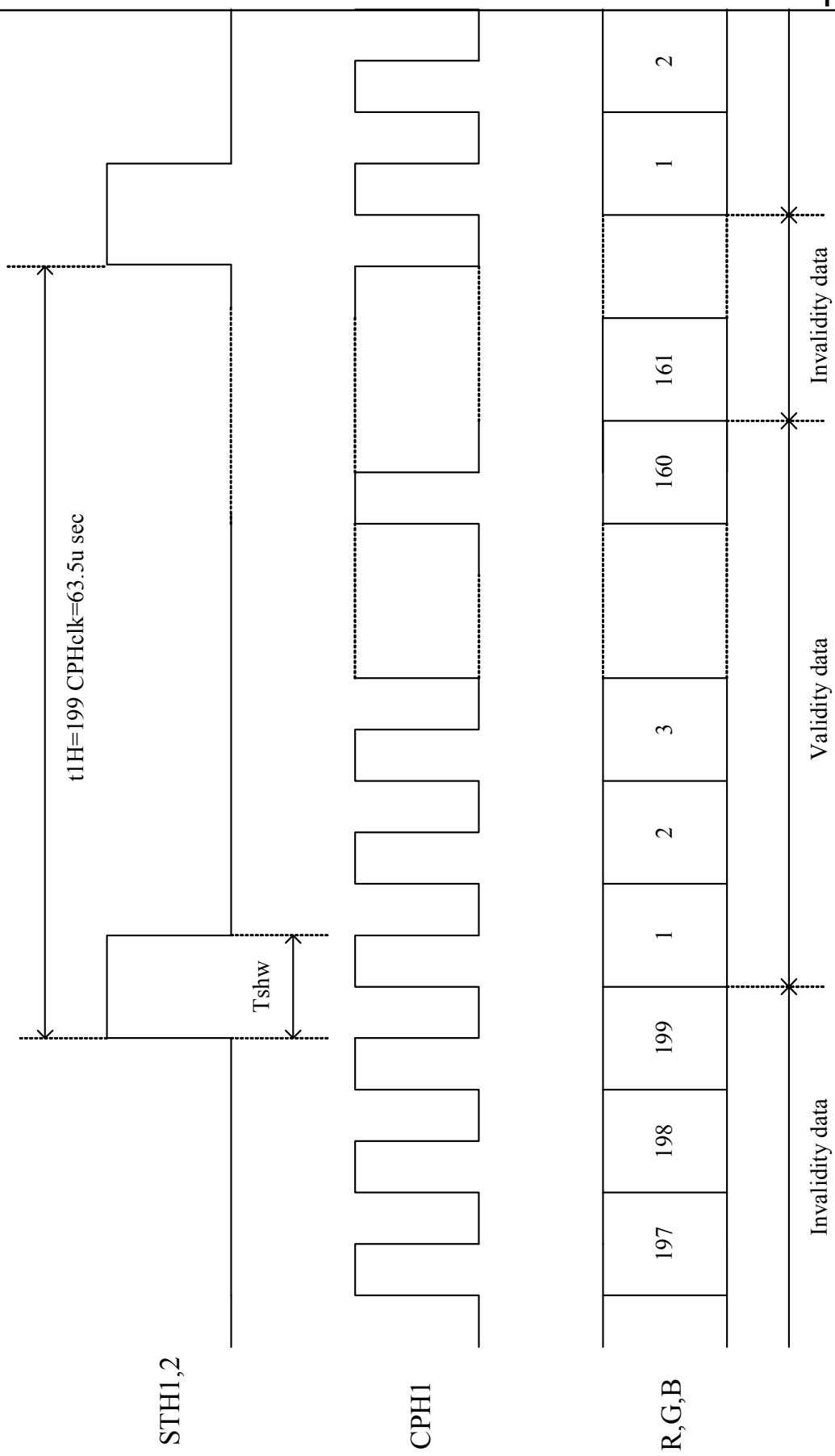


Fig. 8-3 Horizontal Start Pixel

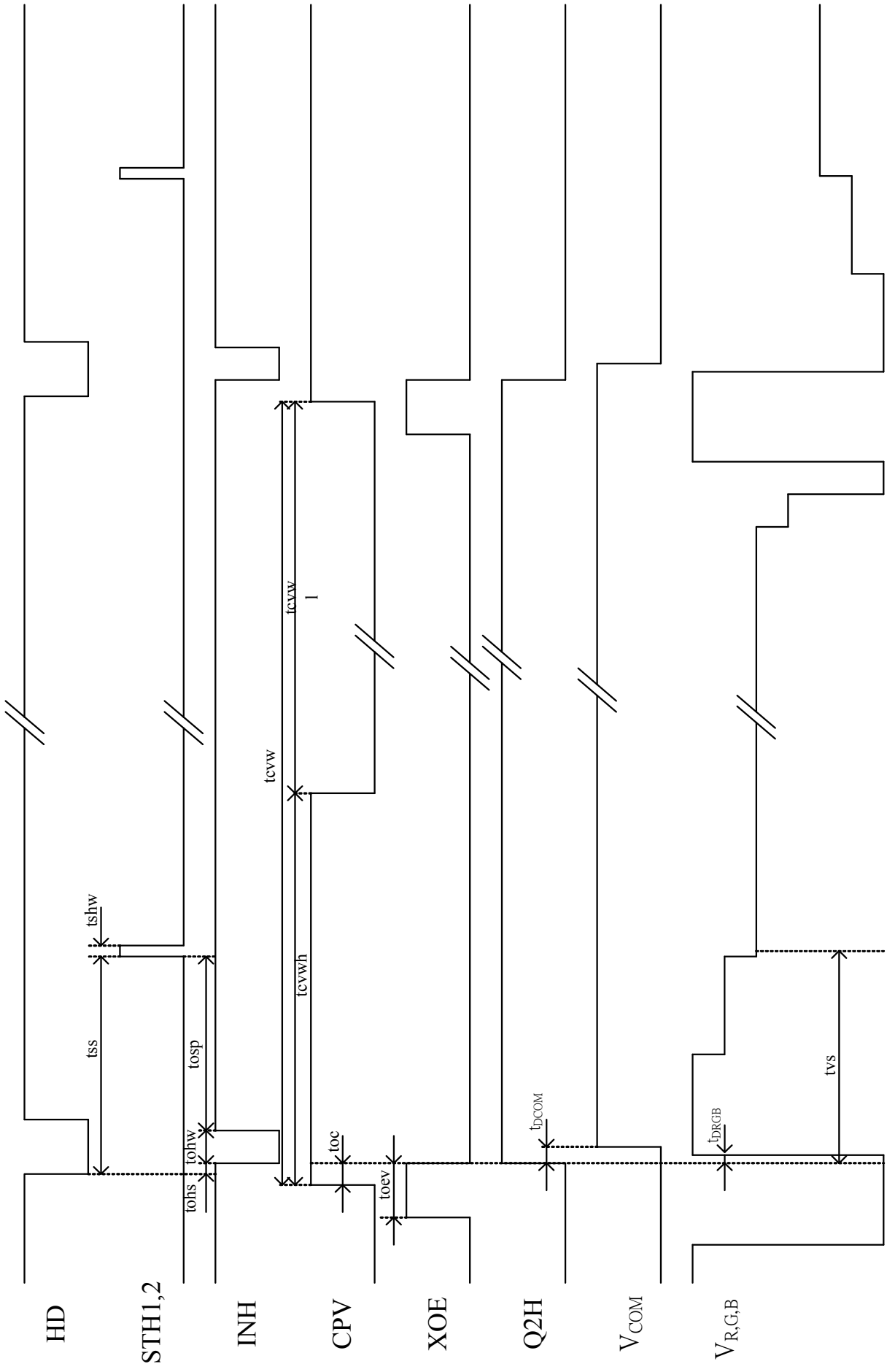


Fig. 8-4 Detail Horizontal Timing

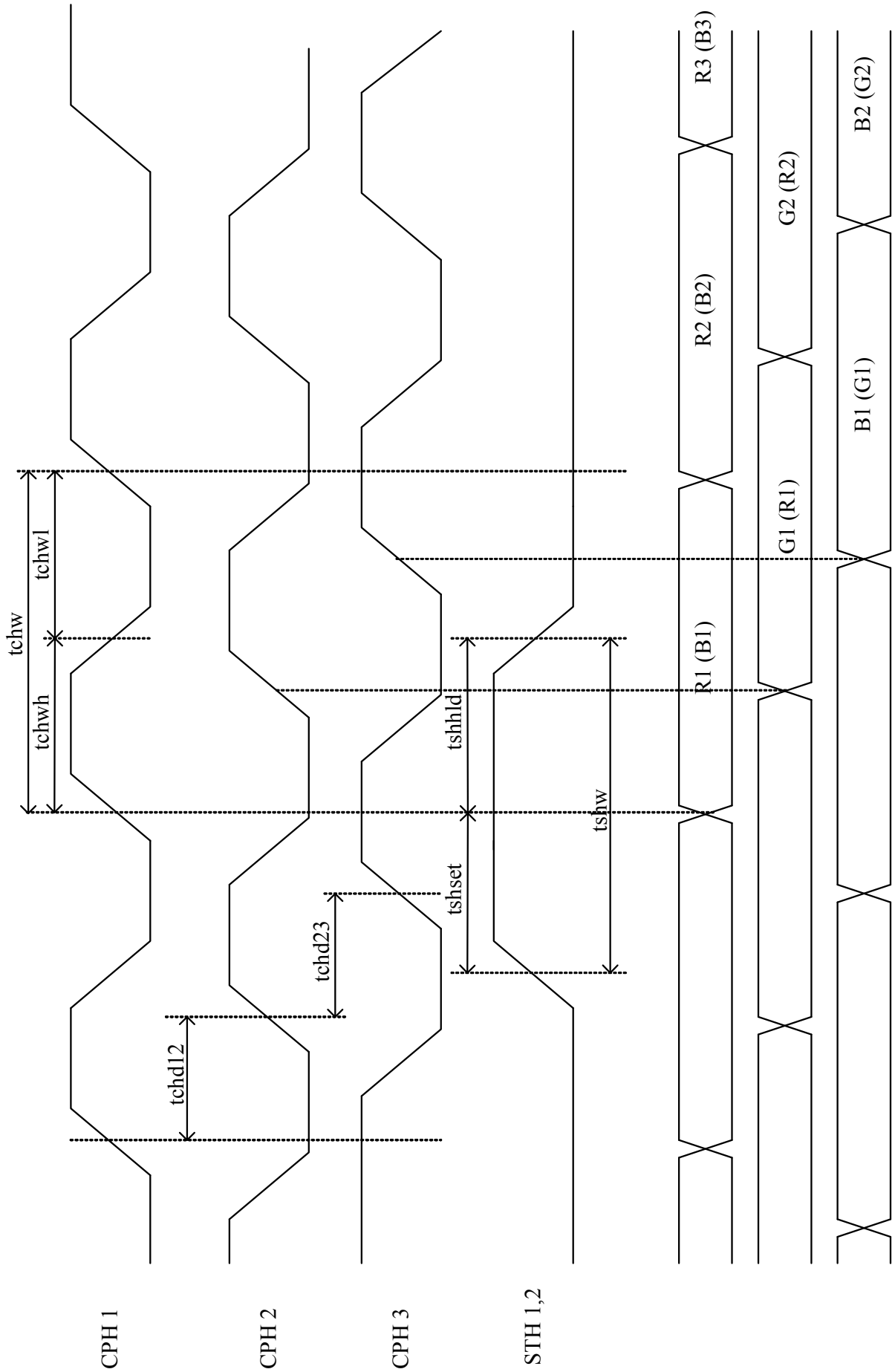


Fig. 8-5 Sampling Clock Timing

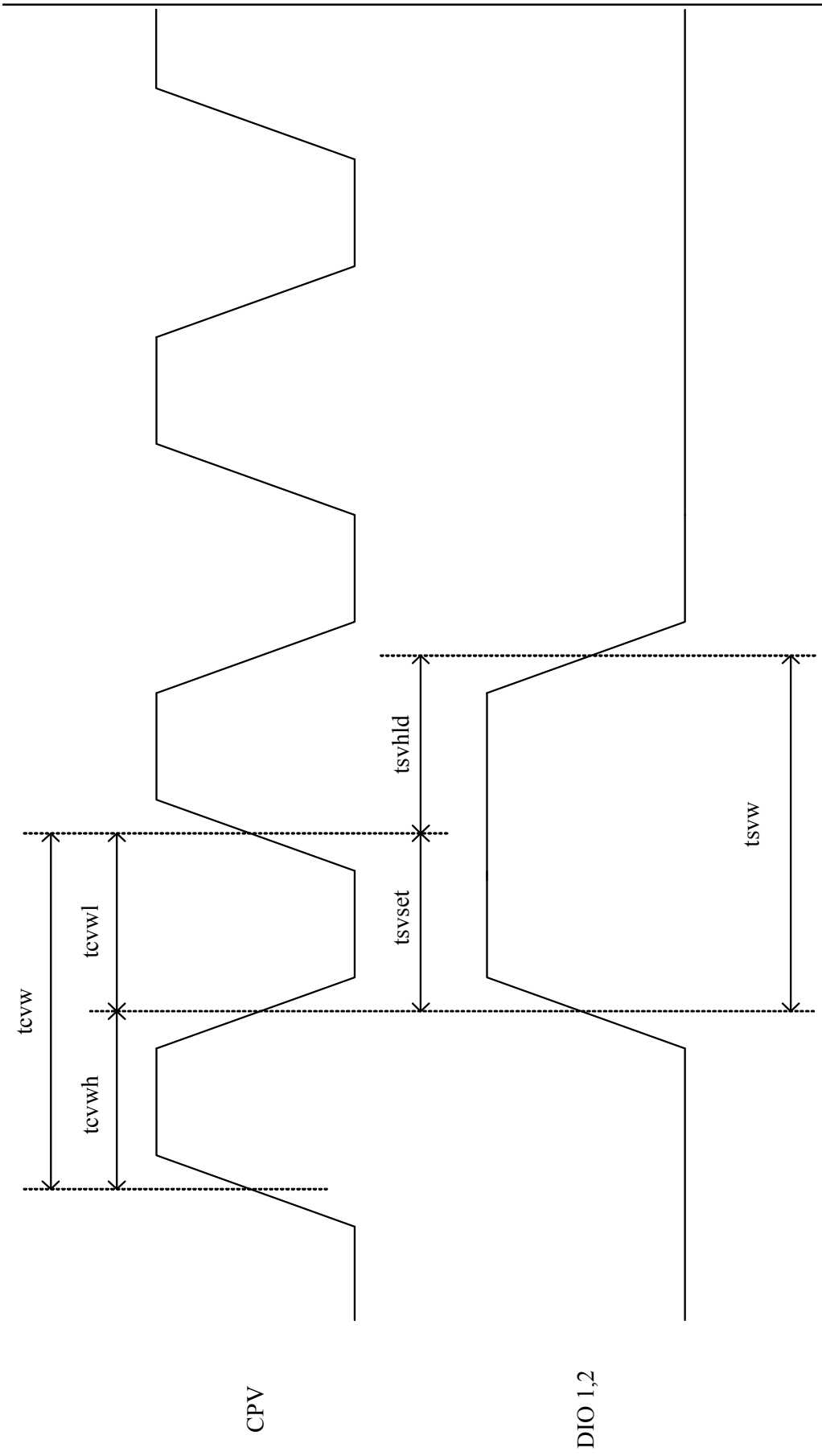


Fig. 8-6 Vertical Shift Clock Timing

Vertical timing (From up to down)

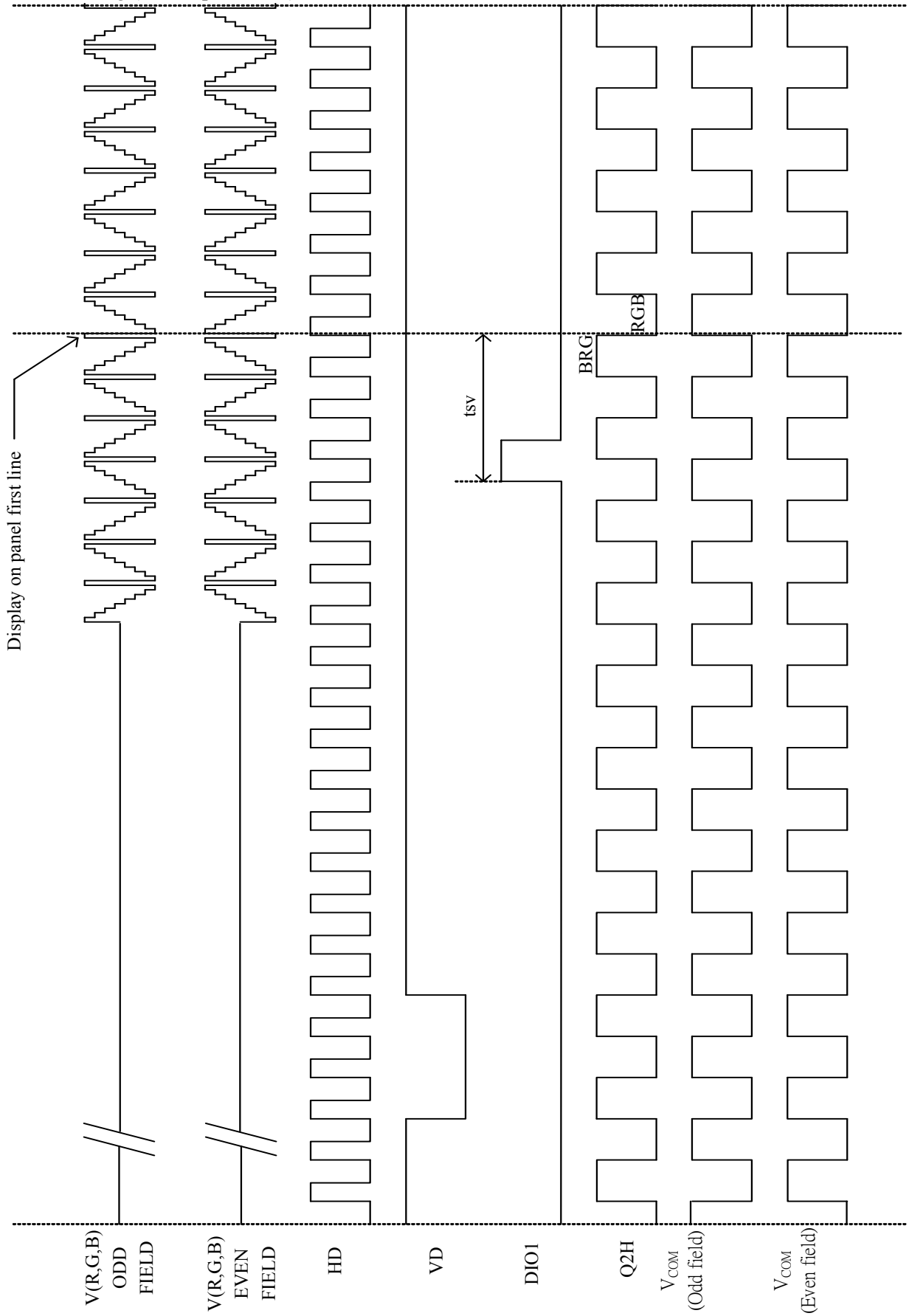


Fig. 8-7(a) Vertical Timing (From Up to Down)

Vertical timing (From down to up)

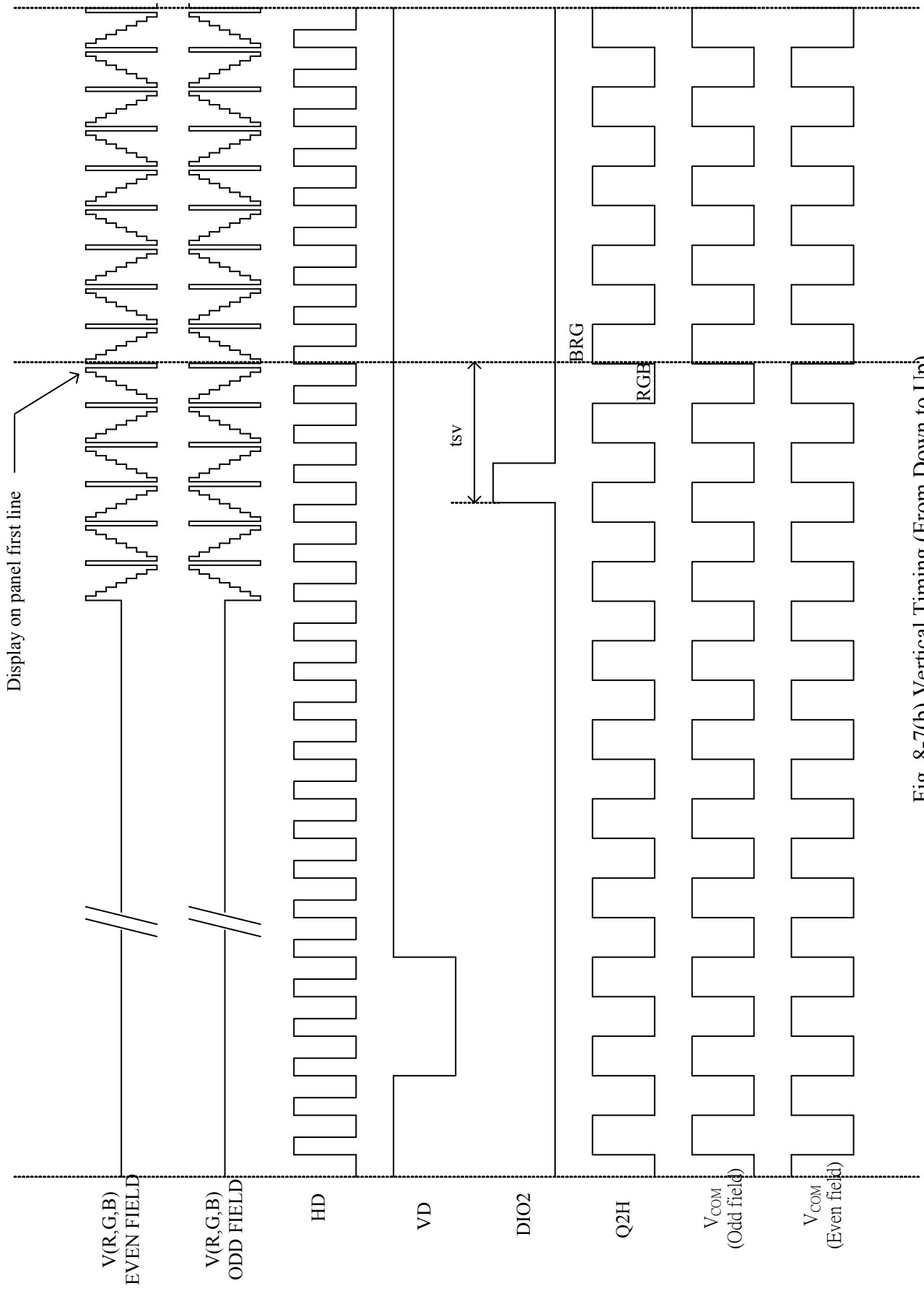
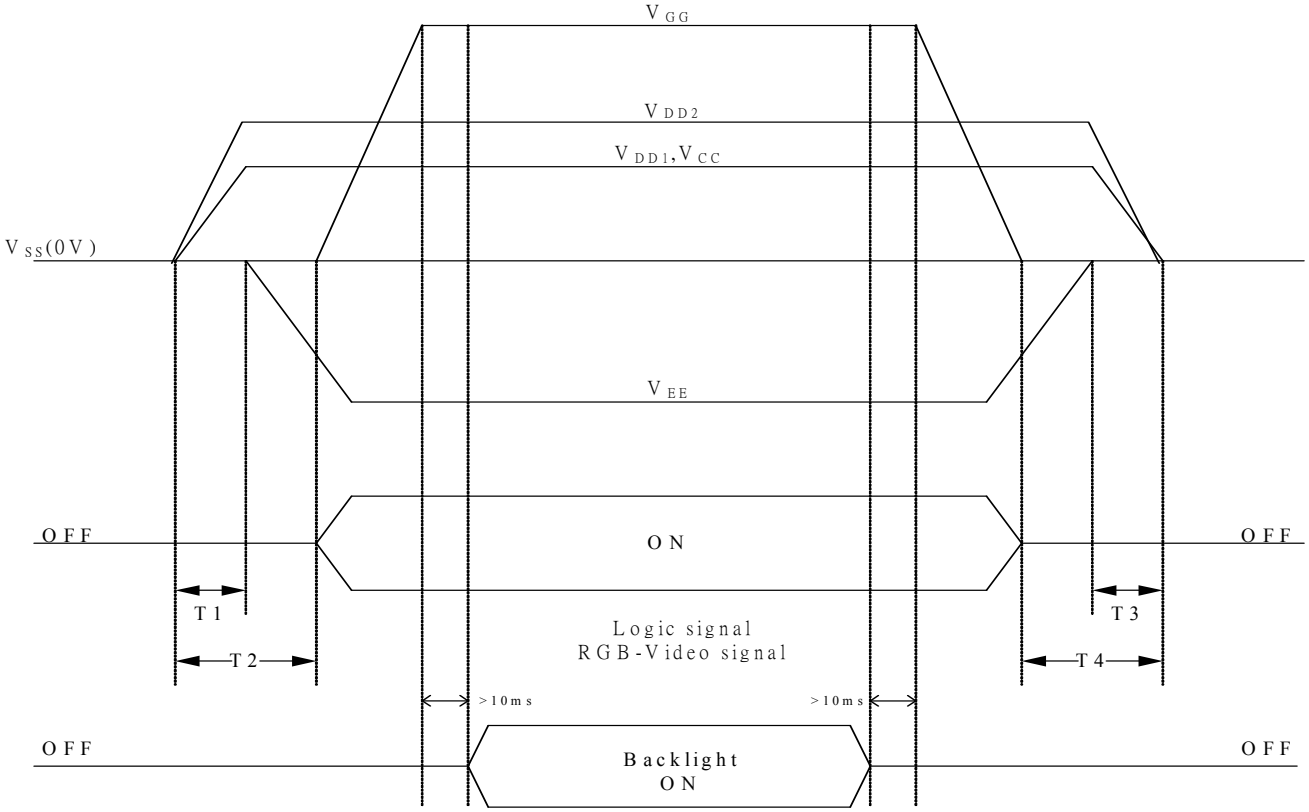


Fig. 8-7(b) Vertical Timing (From Down to Up)

9. Power on Sequence(Voltage source)

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



1) 10ms≦T1<T2
2) 0ms<T3≦T4≦10ms

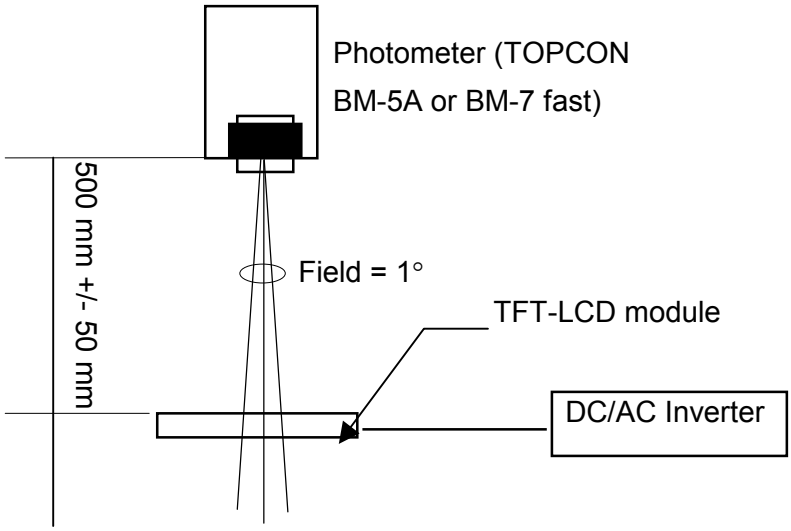
10. Optical Characteristics

10-1) Specification:

Ta = 25℃

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ21, θ22	CR≧10	±45	±50	-	deg	Note 10-1
	Vertical	θ11		30	35	-	deg	Note 10-1
		θ12		10	15	-	deg	Note 10-1
Contrast Ratio		CR	At optimized Viewing angle	200	350	-	-	Note 10-2
Response time	Rise	Tr	θ=0°	-	15	30	ms	Note 10-3
	Fall	Tf		-	25	50	ms	
Uniformity		U		70	75		%	Note 10-4
Brightness		L		200	250		cd/㎡	
White Chromaticity		x	θ=0°	0.28	0.31	0.34	-	
		y	θ=0°	0.30	0.33	0.36	-	
LED Life Time			+25℃	-	10000	-	hrs	Note10-5

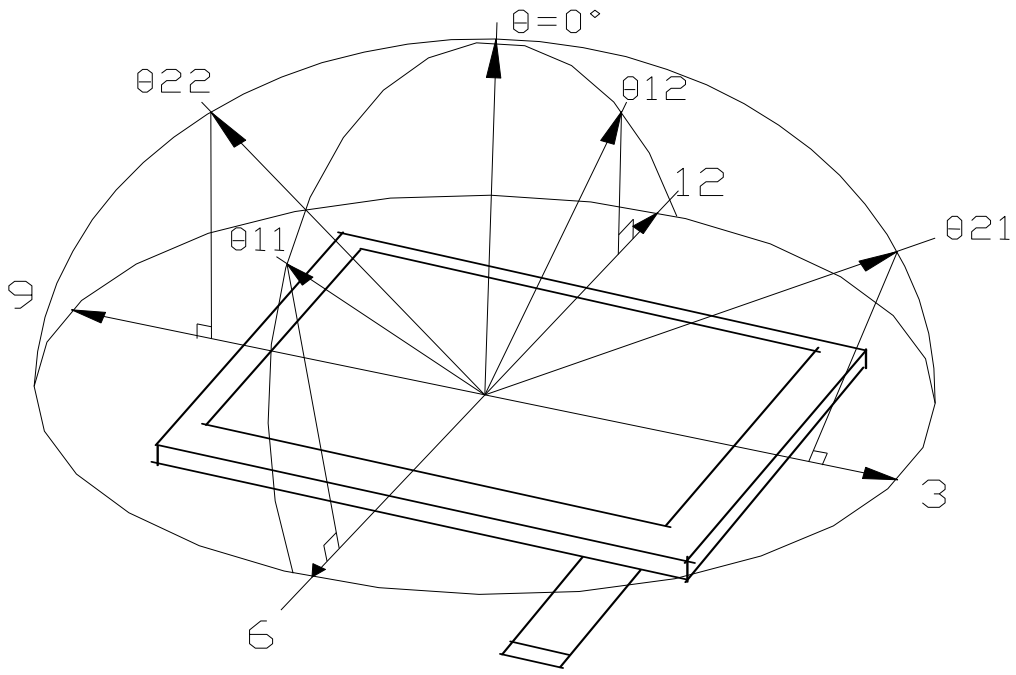
All the optical measurement shall be executed 30 minutes after backlight being turn-on. The optical characteristics shall be measured in dark room (ambient illumination on panel surface less than 1 Lux). The measuring configuration shows as following figure.



Optical characteristics measuring configuration

Topcon BM-5A or BM-7 fast luminance meter 1°field of view is used in the testing (after 30 minutes' operation).

Note 10-1 : The definitions of viewing angles

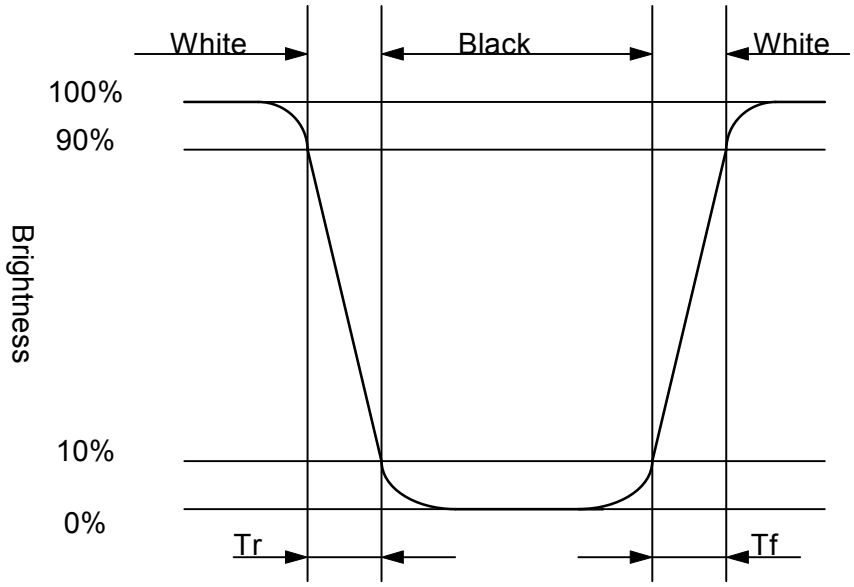


Note 10-2 : CR = $\frac{\text{Luminance when Testing point is White}}{\text{Luminance when Testing point is Black}}$

(Testing configuration see 10-2)

Contrast Ratio is measured in optimum common electrode voltage.

Note 10-3 : The definition of response time :



Note 10-4: The uniformity of LCD is defined as

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

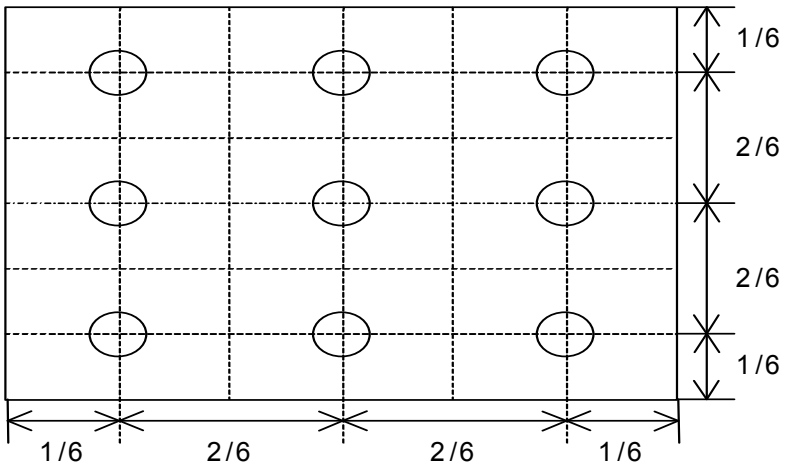
Luminance meter : BM-5A or BM-7 fast(TOPCON)

Measurement distance : 500 mm +/- 50 mm

Ambient illumination : < 1 Lux

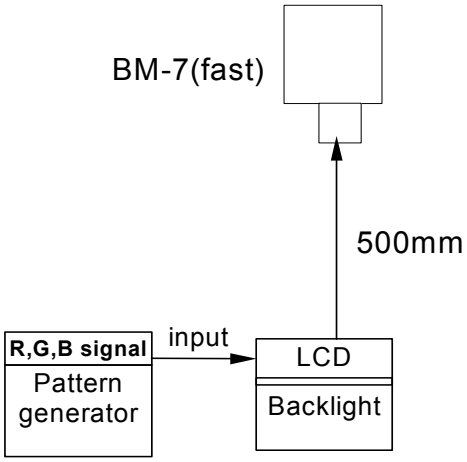
Measuring direction : Perpendicular to the surface of module

The test pattern is white (Gray Level 63).



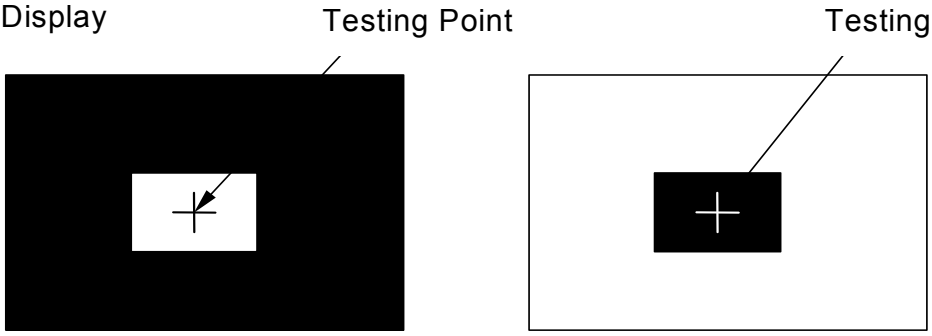
Note 10-5: The “LED Life time “ is defined as the module brightness decrease to 50% original Brightness that the ambient temperature is 25℃ and I_{LED} =20mA.

10-2) Testing configuration



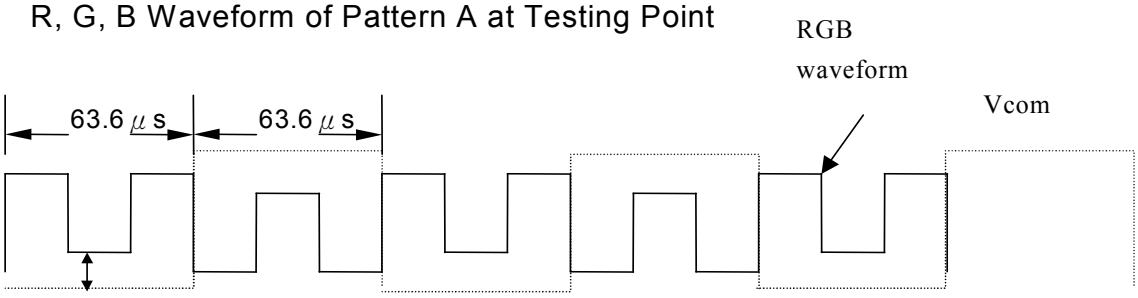
Caution: 1. Environmental illumination ≦ 1 lux
2. Before test CR, Vcom voltage must be adjusted carefully to get the best CR.

- LCD Display



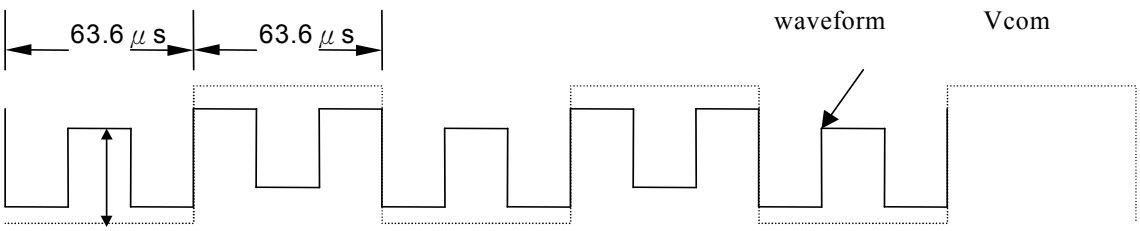
Pattern A Pattern B

- 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 =+70℃, 240 hrs
2	Low Temperature Storage Test	Ta = -20℃, 240 hrs
3	High Temperature Operation Test	Ta = 60℃, 240 hrs
4	Low Temperature Operation Test	Ta = 0℃, 240 hrs
5	High Temperature & High Humidity Operation Test	Ta = 60℃, 90%RH, 240 hrs
6	Thermal Cycling Test (non-operating)	-20℃→+70℃, 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

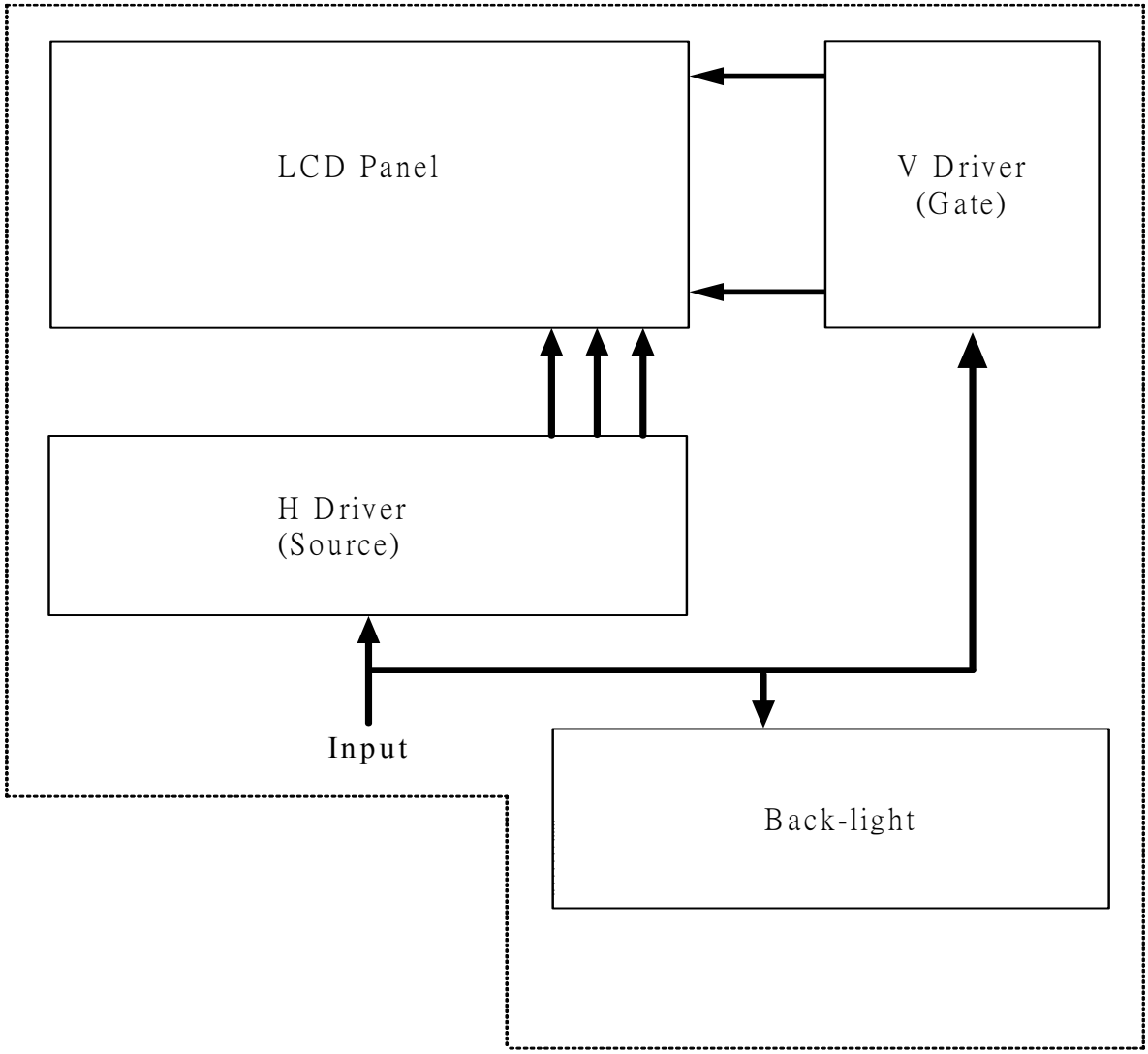
Ta: ambient temperature

Note : The protective film must be removed before temperature test.

[Criteria]

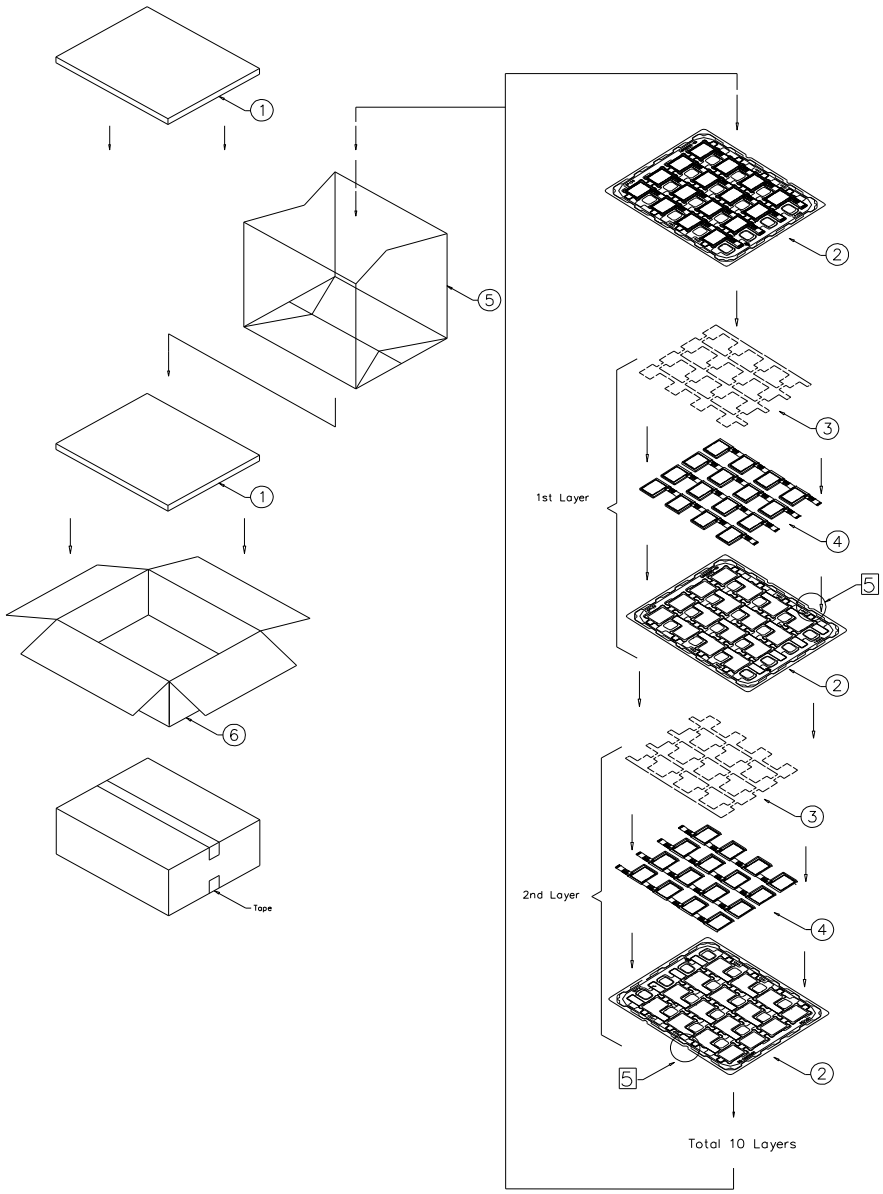
In the standard conditions, there is not display function NG issue occurred. (including : line defect ,no image).All the cosmetic specification is judged before the reliability stress.

13. Block Diagram



14. Packing

REV.	DESCRIPTION	DESIGN	DATE
1	Cancel the carton(50-0100101)	Ethan	2007.11.5



NOTE:
1.One layer include:1 piece of cushion sheet, 16pcs panel & 1 piece of tray.
2.Q'TY:160 pcs panel/carton.
3.Dimension: 455*375*190mm
4.Weight: 5.5 KG
5.tray需180°交叉堆疊,堆疊後可從側邊檢視圓弧防呆方向是否正確

ITEM	PART NO.	DESCRIPTION	QTY	REMARK
6	50-0100091	CARTON INTERNAL	1	
5	50-0500041	摺口袋450*380*700mm	1	抗靜電
4		PA025XSC	160	
3	50-0200058	EPE CUSHION SHEET	10	抗靜電
2	50-0300992	TRAY	11	抗靜電
1	50-0300491	EPE FOAM	2	

MTL.SPEC.	UNSPECIFIED TOL'S ANGLE ROUGHNESS	REMARK	元太科技股份有限公司 Prime View Internation Co.,ltd.

APPROVE	Frank Shin	'05.06.06	SCALE 1:1	UNIT mm	SHEET 1 OF 1	DWG.TITLE PA025XSC PACKING Dim
CHECK	Frank Shin	'05.06.06				
DESIGN	Dennis	'05.06.06	MTL.NO.	DWG.NO.	REV. 01	A4 SIZE

Appendix