Version : 0.1

TECHNICAL SPECIFICATION

MODEL NO : VM070WX5

☐Customer's Confirmation

Customer _____

Date _____

By _____

Dep	FAE	Panel Design	Electronic Design	Mechanical Design	Product Verification	Prepared by
Sign	劉豐發 10/16	梁秀恒 10/16	楊宗翰 10/12	張傑森 10/12	張玉珍	曾耀慶 10/12

Revision History

Rev.	Issued Date	Revised Contents
1.0	Oct.11.2007	Preliminary

TECHNICAL SPECIFICATION

CONTENTS

1. Application

This data sheet applies to a color TFT LCD module,VM070WX5

VM070WX5 module applies to OA product, portable DVD, car TV (must use Analog to Digital driving board), which requires high quality flat panel display. If you must use in severe reliability environment, please don't extend over PVI's reliability test conditions. If you use VM070WX5, Prime View advises your systems use PVI's timing controller IC (PVI-2003A) which will generate proper timing signals to control VM070WX5.

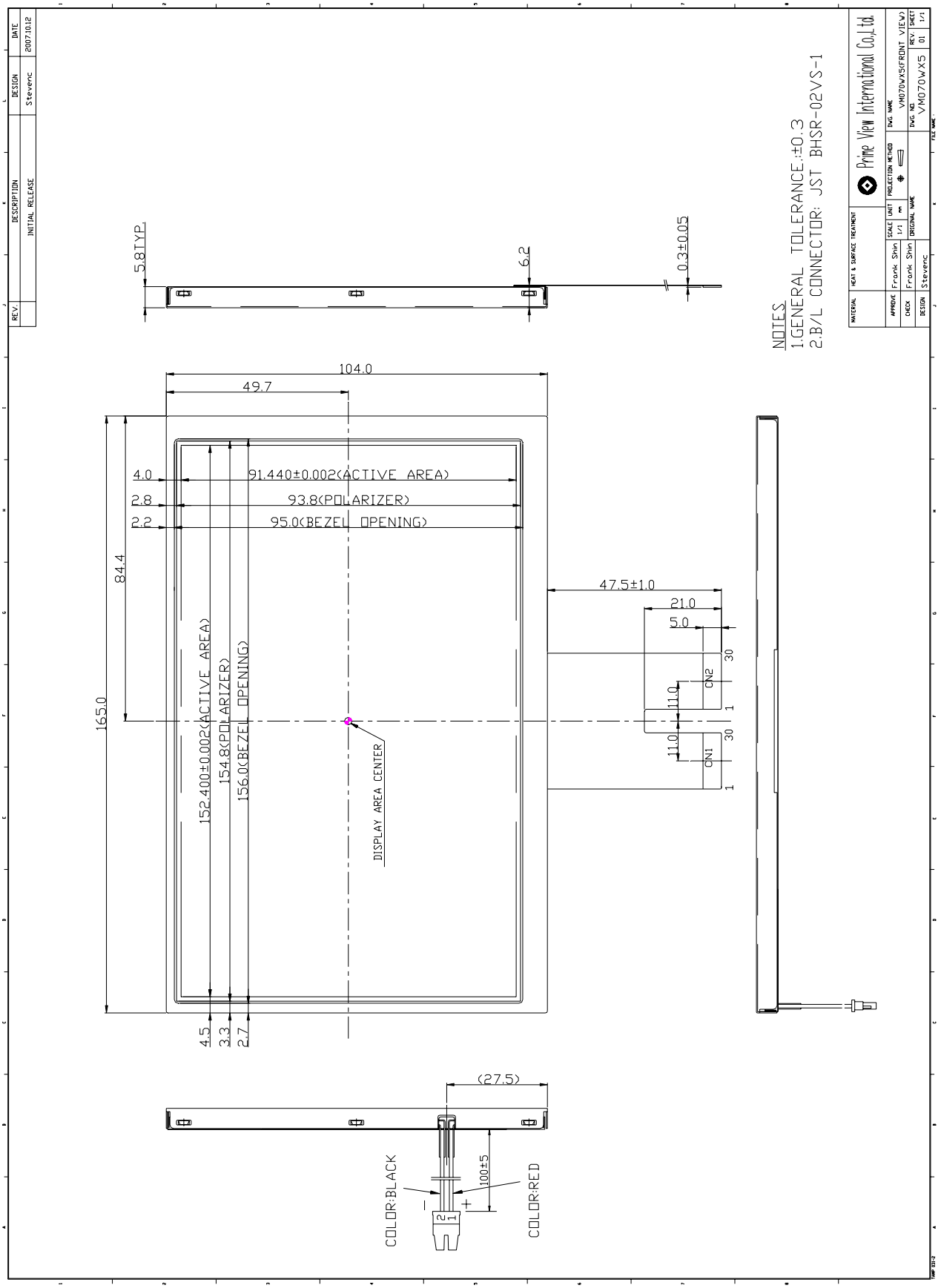
2. Features

. Wide viewing angle
. High contrast ratio
. Fast response time
. Wide VGA (800*480 pixels) resolution
. Amorphous silicon TFT LCD panel with back-light unit
. Thin and light weight
. TTL transmission interface

3. Mechanical Specifications

Parameter	Specifications	Unit
Screen Size	7.0 (diagonal)	inch
Display Format	800 × (R,G,B) × 480	dot
Display Colors	262,144	
Active Area	152.4 (H) × 91.44 (V)	mm
Pixel Pitch	0.1905(H)×0.1905(V)	mm
Pixel Configuration	RGB vertical stripe	
Outline Dimension	165.0 (W) × 104.0 (H) × 6.2 (typ.) (D)	mm
Weight	TBD	g
Back-light	LED	
Surface treatment	Anti-Glare	
Display mode	Normally black	

4. Mechanical Drawing of TFT-LCD Module



5. Input / Output Terminals

5-1) TFT-LCD Panel Driving

CN 1

Pin No.	Symbol	I/O	Function	Remark
1	DIO1	I/O	Horizontal Start Pulse Signal Input or Output	Note 5-5
2	VSS1	I	Ground	
3	VDD	I	Power Supply	
4	CLK	I	Horizontal Shift Clock	
5	VSS1	I	Ground	
6	R/L	I	Right / Left selection	Note 5-5
7	R0	I	Red Data (LSB)	
8	R1	I	Red Data	
9	R2	I	Red Data	
10	R3	I	Red Data	
11	R4	I	Red Data	
12	R5	I	Red Data (MSB)	
13	VSS1	I	Ground	
14	G0	I	Green Data (LSB)	
15	G1	I	Green Data	
16	G2	I	Green Data	
17	G3	I	Green Data	
18	G4	I	Green Data	
19	G5	I	Green Data (MSB)	
20	VSS1	I	Ground	
21	B0	I	Blue Data (LSB)	
22	B1	I	Blue Data	
23	B2	I	Blue Data	
24	B3	I	Blue Data	
25	B4	I	Blue Data	
26	B5	I	Blue Data (MSB)	
27	LD	I	Load output signal	Note 5-6
28	REV	I	Data invert control	Note 5-7
29	POL	I	Polarity selection	Note 5-8
30	DIO2	I/O	Horizontal Start Pulse Signal Input or Output	Note 5-5

CN2

Pin No.	Symbol	I/O	Function	Remark
1	VSS2	I	Ground	
2	V1	I	Gamma Voltage 1	Note 5-11
3	V2	I	Gamma Voltage 2	Note 5-11
4	V3	I	Gamma Voltage 3	Note 5-11
5	V4	I	Gamma Voltage 4	Note 5-11
6	V5	I	Gamma Voltage 5	Note 5-11
7	V6	I	Gamma Voltage 6	Note 5-11
8	V7	I	Gamma Voltage 7	Note 5-11
9	VSS2	I	Ground	
10	V8	I	Gamma Voltage 8	Note 5-11
11	V9	I	Gamma Voltage 9	Note 5-11
12	V10	I	Gamma Voltage 10	Note 5-11
13	V11	I	Gamma Voltage 11	Note 5-11
14	V12	I	Gamma Voltage 12	Note 5-11
15	V13	I	Gamma Voltage 13	Note 5-11
16	V14	I	Gamma Voltage 14	Note 5-11
17	VSS2	I	Ground	
18	AVDD	I	Voltage for analog circuit	
19	VCOM	I	Common Voltage	
20	XON	I	NC	Note 5-10
21	OE	I	Output Enable	Note 5-4
22	U/D	I	Up / Down Selection	Note 5-3
23	CKV	I	Vertical Shift Clock	Note 5-9
24	STVU	I/O	Vertical Shift Pulse Signal Input or Output	Note 5-3
25	STVD	I/O	Vertical Shift Pulse Signal Input or Output	Note 5-3
26	VGH	I	Gate On Voltage	Note 5-2
27	GND	I	Ground	
28	VCC	I	Voltage for logic circuit	
29	GND	I	Ground	
30	VGL	I	Gate Off Voltage	Note 5-1

Note 5-1: Gate off voltage, $V_{GL(TYP.)}$=-8V.

Note 5-2: Gate on voltage, $V_{GH(TYP.)}$=+18.3V.

Note 5-3: Select up or down shift

U/D	STVU	STVD	Shift
1	Hi-Z	Input	Down to Up
0	Input	Hi-Z	Up to Down

Note 5-4: When OE is connected to high “1”, the driver outputs are disabled (Gate output = V_{GL}). Under this condition, the operation of registers will not be affected.

Note 5-5: Select left or right shift

R/L	DIO1	DIO2	Shift
1	Input	Hi-Z	Left to right
0	Hi-Z	Input	Right to left

Note 5-6: Latch the polarity of outputs and switch the new data to outputs. At the rising edge (LD), latch the “POL” signal to control the polarity of the outputs.

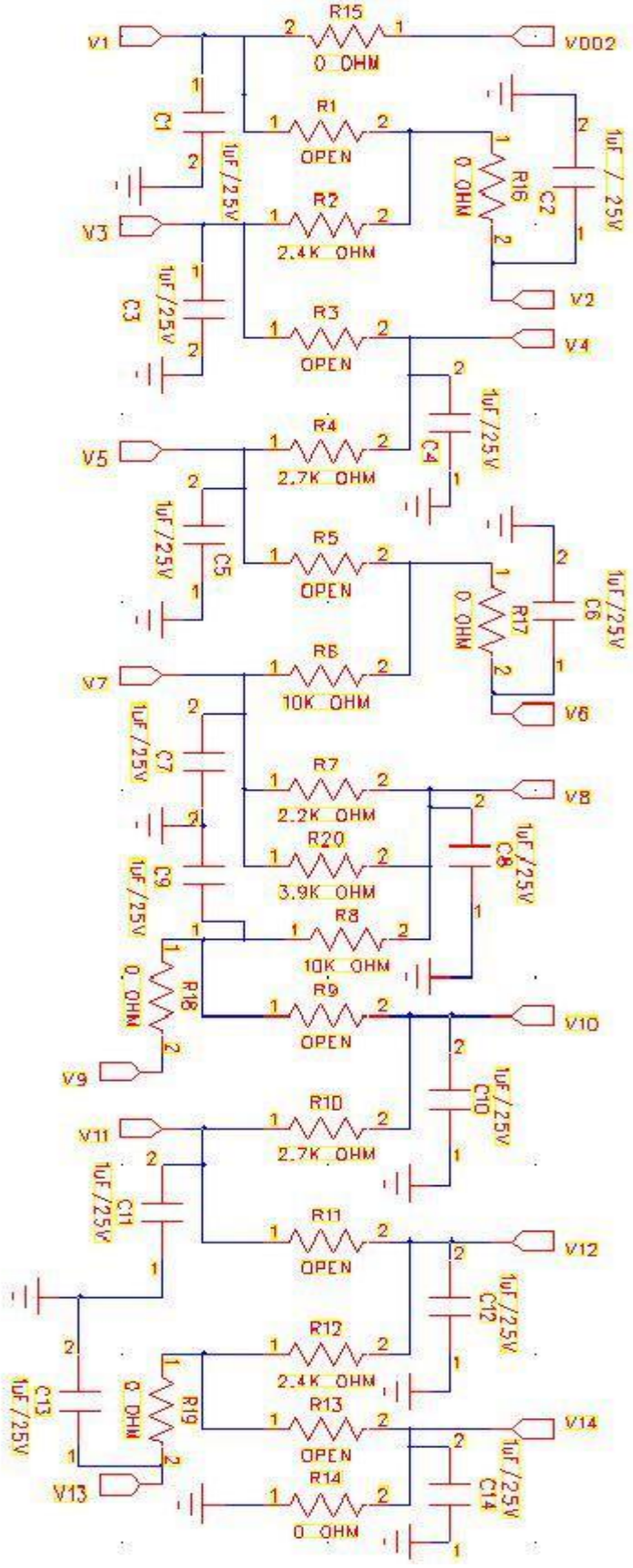
Note 5-7: Control whether the Data R0~G5 are inverted or not. (PVI suggests connecting to High) When “REV=1”, these data will be inverted.
EX: “00”→”3F”, “07”→”38”, “15”→”2A”

Note 5-8: Polarity selector for dot-inversion control. Available at the rising edge of LD. When POL=1: Even outputs range from V1~V7, and Odd outputs range from V8~V14; When POL=0: Even outputs range from V8~V14, and Odd outputs range from V1~V7.

Note 5-9:Gate driver shift clock

Note 5-10:This pin is NC or must connect VDD

Note 5-11: Typical Application Circuit (When $AV_{DD(TYP.)}$ = +12V)



6.Absolute Maximum Ratings:

Vss1=Vss2=GND=0V, Ta=25℃

Parameters	Symbol	MIN.	MAX.	Unit	Remark
Supply Voltage	V_{DD}	-0.3	5.0	V	
	V_{CC}			V	
	AV_{DD}	-0.5	12.0	V	
	V_{GH}	-0.3	40.0	V	
	V_{GH}-V_{GL}	-	40	V	
	V_{GL}	-20	0.3	V	

7.Electrical Characteristics

7-1) Recommended Operating Conditions:

Vss1=Vss2=GND = 0V，Ta = 25℃

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply Voltage for Source Driver	V_{DD}	3.0	3.3	3.6	V	
	AV_{DD}	9	12	10	V	
Supply Voltage for Gate Driver	V_{GH}	-	18.3	-	V	
	V_{GL}	-	-8	-	V	
	V_{CC}	3.0	3.3	3.6	V	
Digital Input Voltage	V_{IH}	$0.8V_{DD}$	-	V_{DD}	V	
	V_{IL}	0	-	$0.2V_{DD}$	V	
V_{com} Voltage	V_{com}	-	3.6	-	V	

7-2) Backlight driving

Connector type: JST BHSR-02VS-1

Pin No	Symbol	Description	Remark
1	+	Input terminal (Anode)	Wire color : Red
2	-	Input terminal (Cathode)	Wire Color : Black

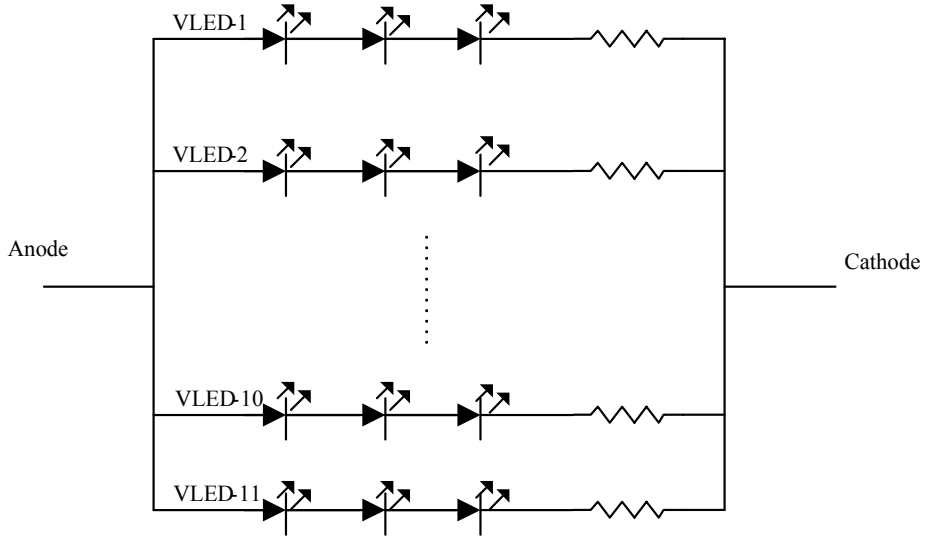
7-3) Recommended driving condition for LED back light

GND = 0 V， Ta = 25℃

Parameter	Symbol	Min	TYP	MAX	Unit	Remark
Supply voltage of LED backlight	V_{LED}	-	11.0	11.5	V	I_{LED} = 20 mA
Supply current of LED backlight	I_{LED}	-	20	-	mA	Note 7-1
Backlight Power Consumption	P_{LED}	-	2.42	2.53	W	Note 7-2

Note 7-1 : The LED driving condition is defined for each LED module. (3 LED Serial)

Note 7-2 : $P_{LED} = V_{LED-1} * I_{LED-1} + V_{LED-2} * I_{LED-2} \ \ldots\ldots + V_{LED-10} * I_{LED-10} + V_{LED-11} * I_{LED-11}$



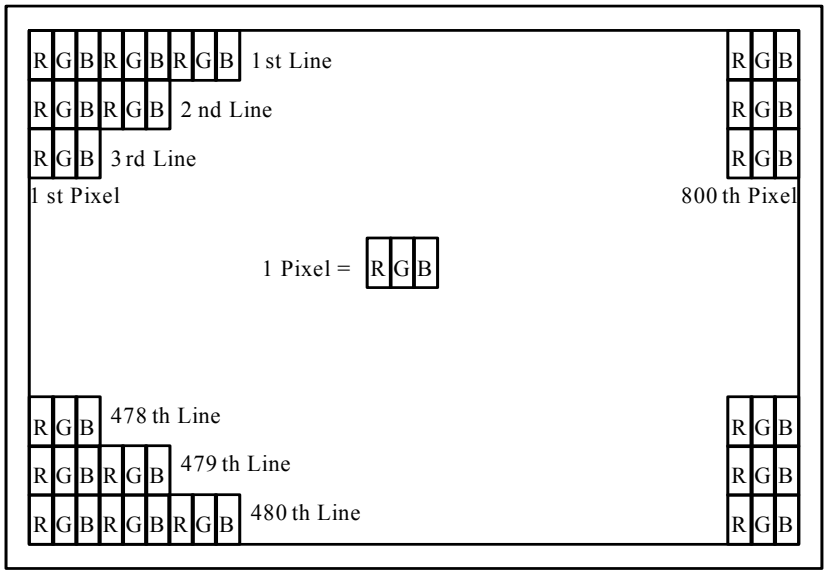
7-4) Power Consumption

GND = 0 V， Ta = 25℃

Parameter	Symbol	Condition	Typ.	Max.	Unit	Remark
Supply Current for Gate Driver (Hi level)	I_{GH}	V_{GH}=+18.3V	0.09	0.27	mA	
Supply Current for Gate Driver (Low level)	I_{GL}	V_{GL}=-8.0V	2.6	7.8	mA	
Supply Current for Source Driver (Digital)	I_{DD}	V_{DD}=+3.3V	1.85	3.7	mA	
Supply Current for Source Driver (Analog)	AI_{DD}	AV_{DD}=+12V	23.95	47.9	mA	
Supply Current for Gate Driver (Digital)	I_{CC}	V_{CC}=+3.3V	0.1	0.3	mA	
LCD Panel Power Consumption(W/O B/L)	-	-	306	655	mW	
Total Power Consumption	-	-	2.72	3.18	W	

8. Pixel Arrangement

The LCD module pixel arrangement is the stripe.

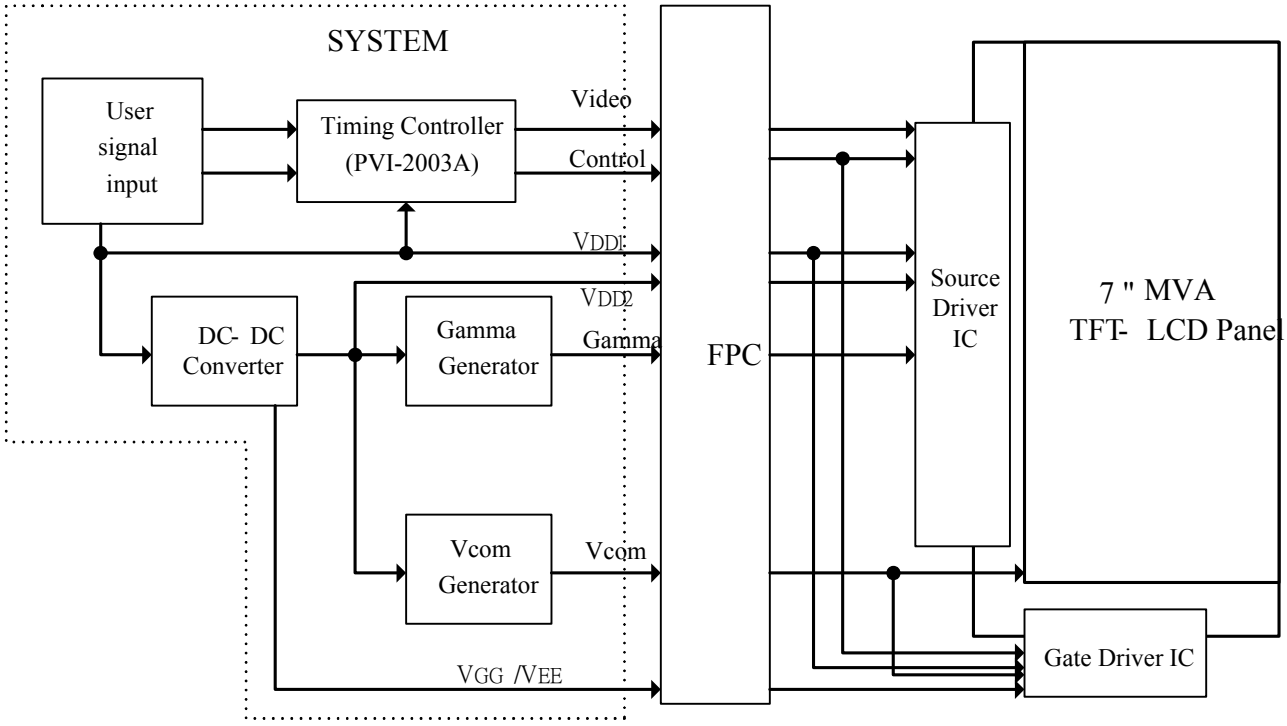


9. Display Color and Gray Scale Reference

Color		Input Color Data																	
		Red						Green						Blue					
		R5	**R4**	**R3**	**R2**	**R1**	**R0**	**G5**	**G4**	**G3**	**G2**	**G1**	**G0**	**B5**	**B4**	**B3**	**B2**	**B1**	**B0**
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red	Red (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (01)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red (02)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker																		
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Brighter																		
	Red (61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red (62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Green (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green (01)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green (02)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Darker																		
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Brighter																		
	Green (61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green (62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Blue (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue (01)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue (02)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Darker																		
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Brighter																		
	Blue (61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue (62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

10. Block Diagram

10-1) TFT-module Block Diagram



If you use VM070WX5, you can apply PVI-2003A (Timing controller) which will generate timing signals to support VM070WX5

11. Interface Timing

11.1) Timing Parameters

AC Electrical Characteristics (V_{CC}=V_{DD}=3.3V, AV_{DD2}=12V, GND=V_{SS1}=V_{SS2}=0V, Ta=25℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit
CLK Frequency	Fclk	-	32	40	MHz
CLK Pulse Width	Tcw	25	-	-	ns
Data Set-up Time	Tsu	4	-	-	ns
Data Hold Time	Thd	2	-	-	ns
Propagation Delay of DIO2/1	Tphl	6	10	15	ns
Time That The Last Data to LD	Tld	1	-	-	Tcw
Pulse width of LD	Twld	2	-	-	Tcw
Time That LD to DIO1/2	Tlds	5	-	-	Tcw
POL Set-up Time	Tpsu	6	-	-	ns
POL Hold Time	Tphd	6	-	-	ns
OE Pulse Width	T_{OEV}	1	-	-	μs
CKV Pulse Width	T_{CKV}	500	-	-	ns
STV Set-up Time	T_{SUV}	400	-	-	ns
STV Hold Time	T_{HDV}	400	-	-	ns
Horizontal Display Period	T_{HDP}	-	800	-	Tcw
Horizontal Period Timing Range	T_{HP}	-	1056	-	Tcw
Horizontal Lines Per Field	T_V	484	508	620	T_{HP}
Vertical Display Timing Range	T_{DV}	-	480	-	T_{HP}

11.2) Timing Diagram

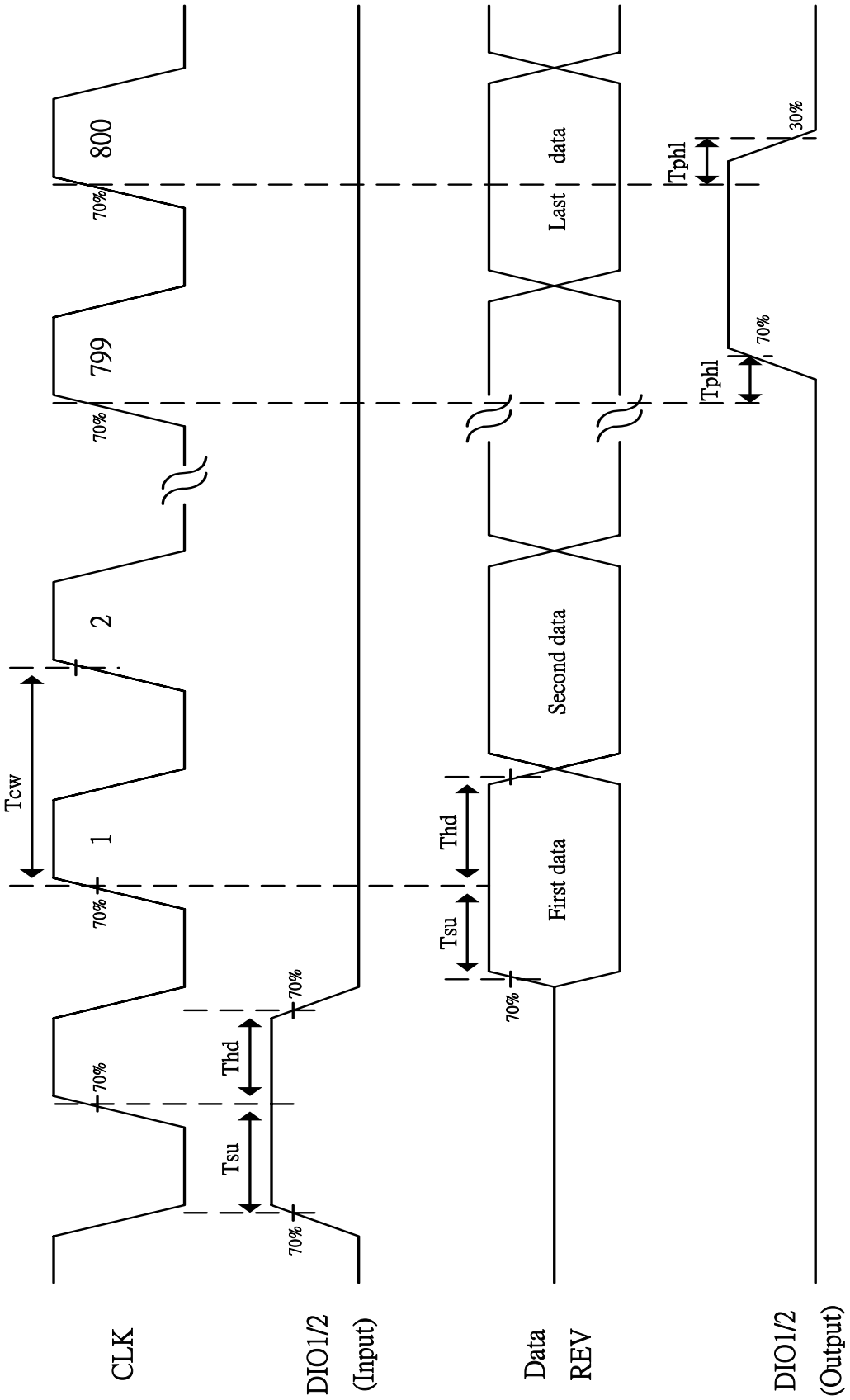


Fig. 11-1 Horizontal timing (1)

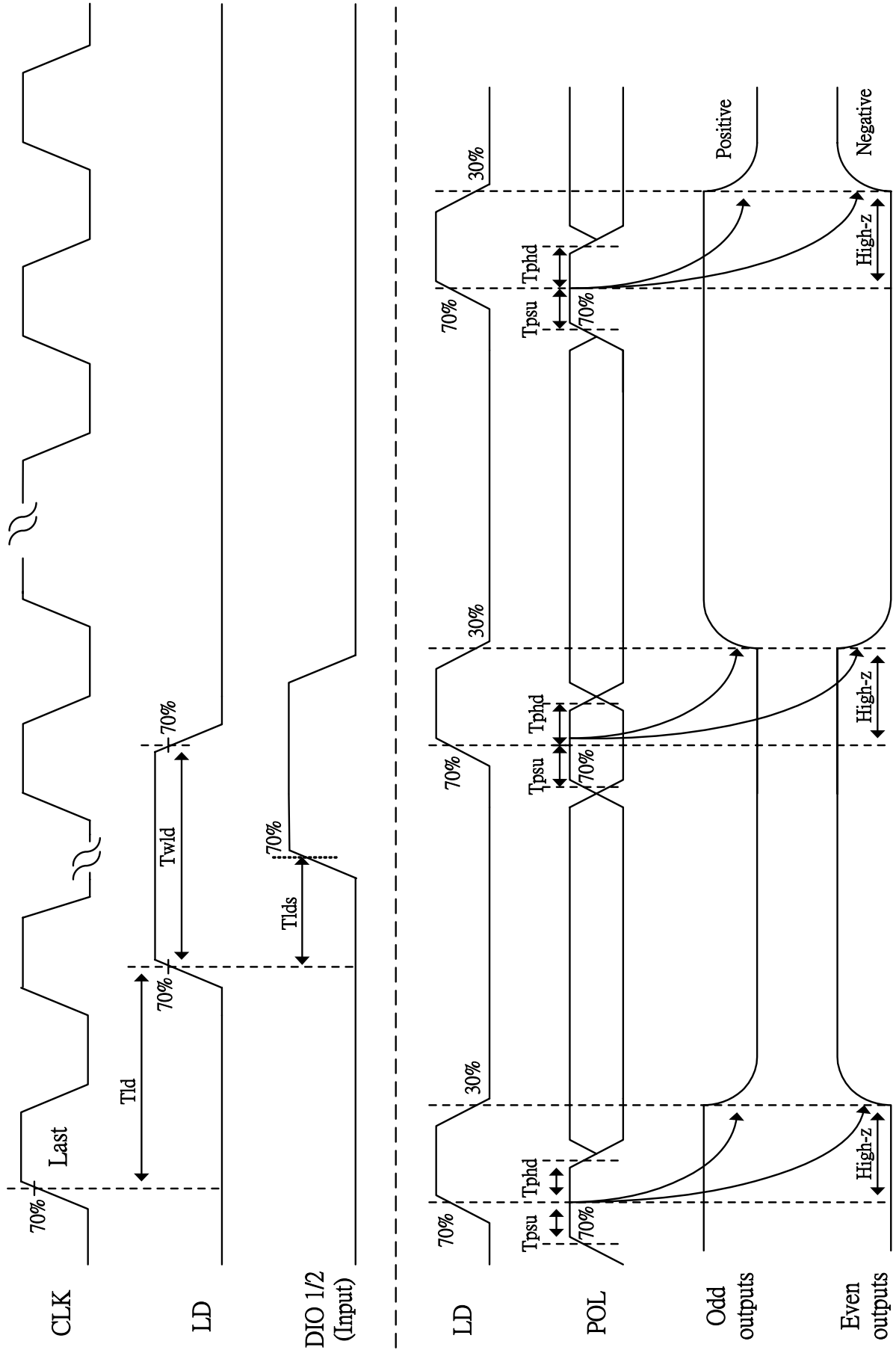


Fig. 11-2 Horizontal timing(2)

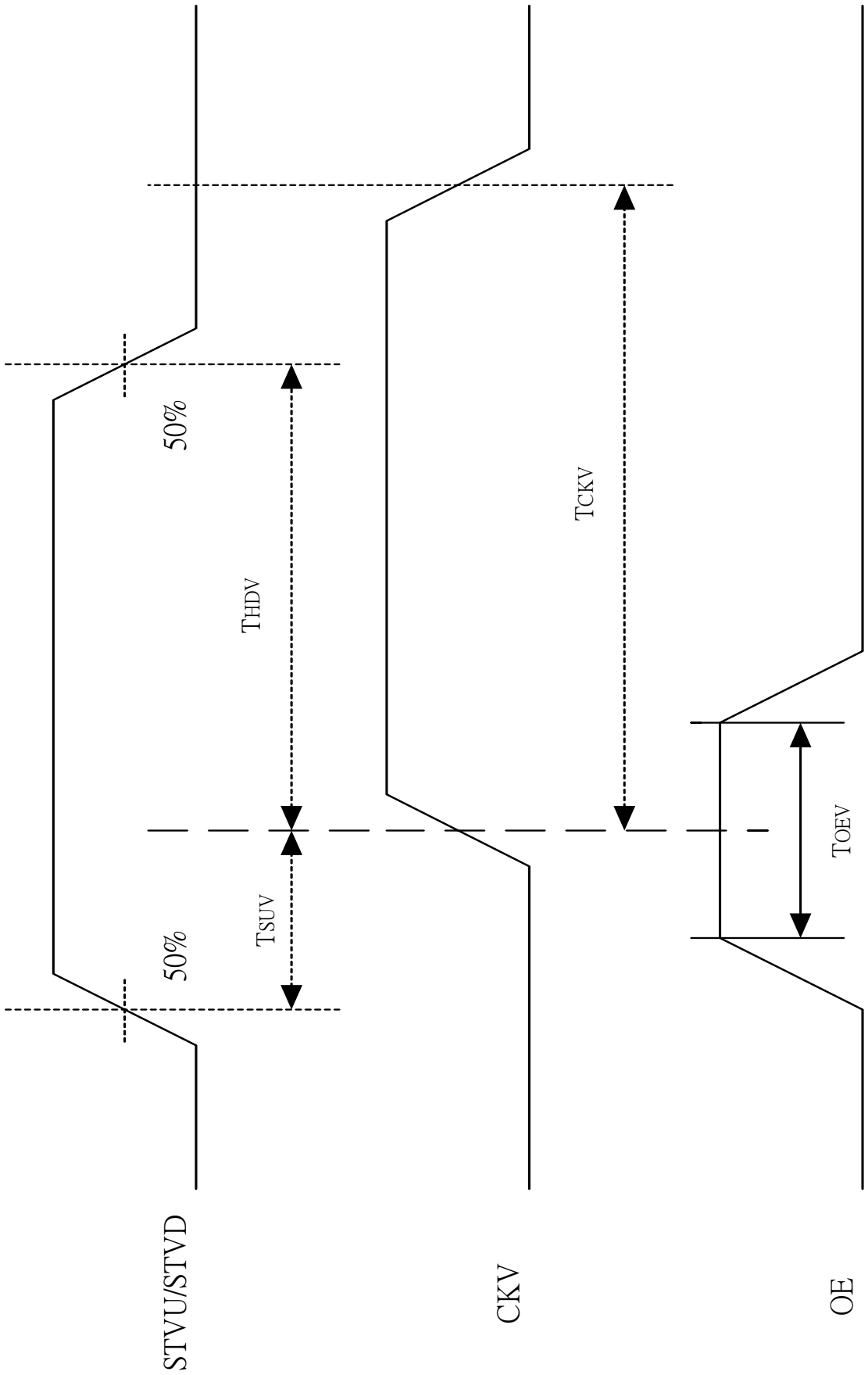


Fig. 11-3 Vertical shift clock timing

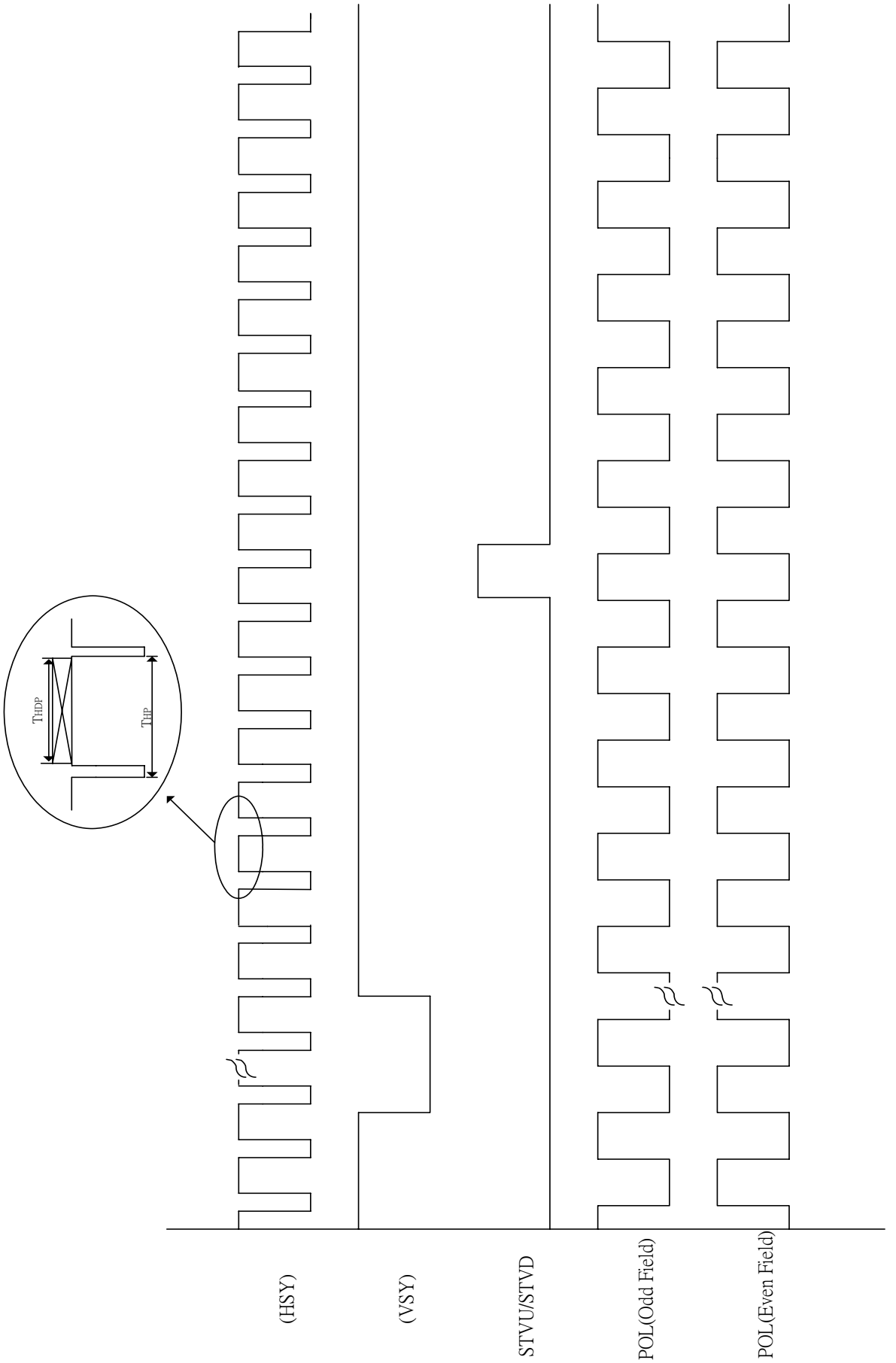
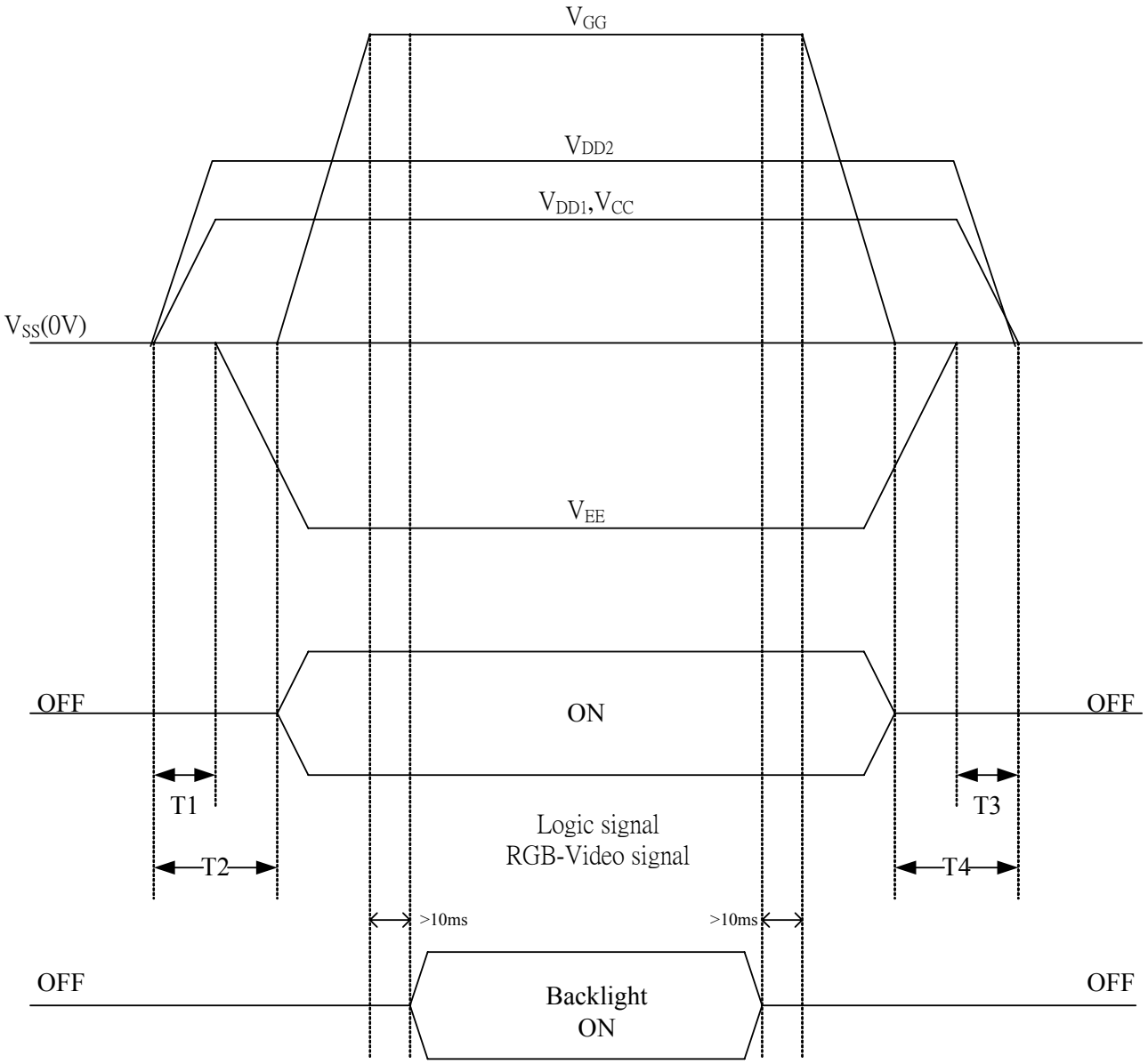


Fig. 11-4 Vertical timing

12. Power On Sequence



1.10ms≦T1＜T2

2. 0ms＜T3≦T4≦10ms

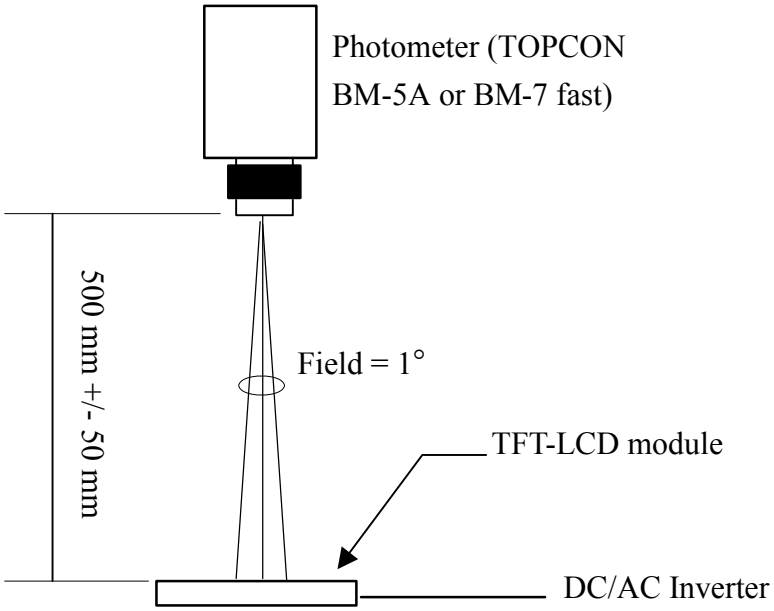
13. Optical Characteristics

13-1) Specification:

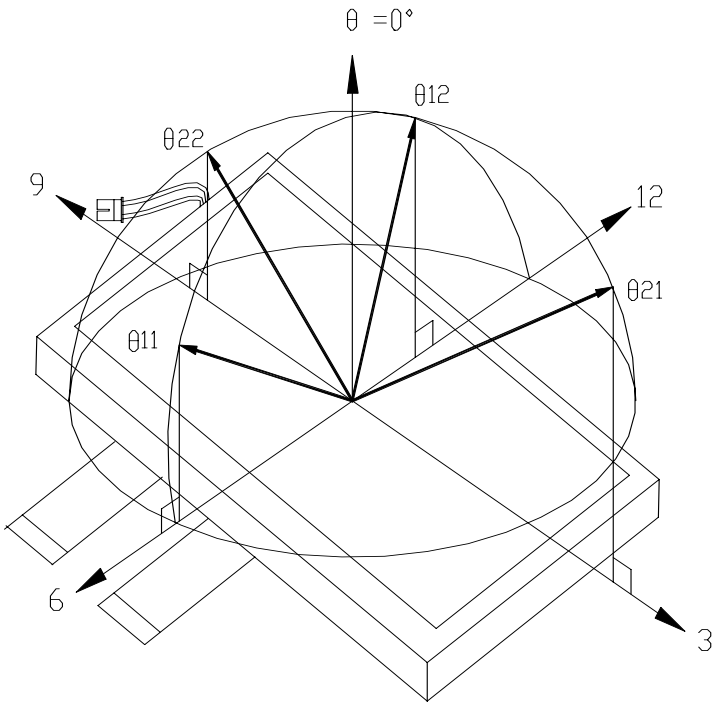
Ta=25℃

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ21、θ22	CR＞10	±85	±85		deg	Note 13-1
	Vertical	θ11、θ12		±85	±85	-	deg	
Contrast Ratio		CR		600	1000	-	-	Note 13-2
Response time	Rise	Tr	θ=0°	-	25	50	ms	Note 13-3
	Fall	Tf		-	15	30	ms	
Brightness		L	θ=0°/φ=0	300	400		cd/㎡	
Luminance Uniformity		U		70	75	-	%	Note 13-4
LED Life Time				TBD	-	-	hr	Note 13-5
White Chromaticity		x		TBD	TBD	TBD	-	
		y		TBD	TBD	TBD	-	
Cross Talk			θ=0°	-	-	3.5	%	Note 13-6

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.

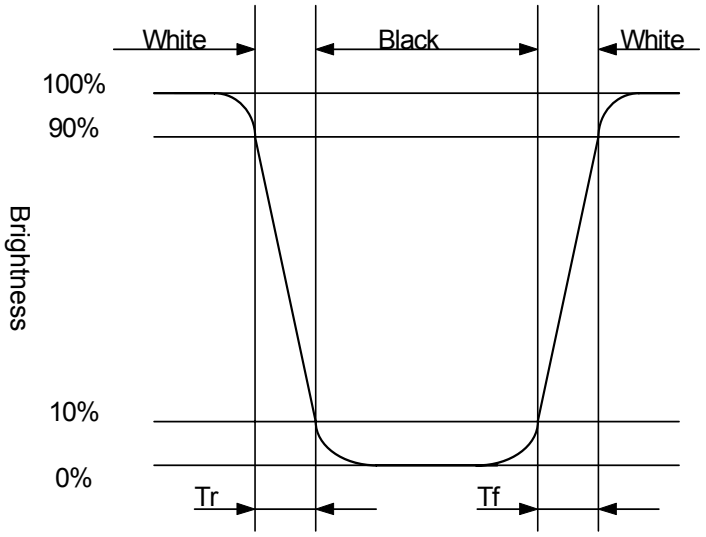


Note 13-1: The definitions of viewing angles are as follow



Note 13-2: The definition of contrast ratio $CR = \frac{\text{Luminance at gray level 63}}{\text{Luminance at gray level 0}}$

Note 13-3: Definition of Response Time T_r and T_f:



Note 13-4: The uniformity of LCD is defined as

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

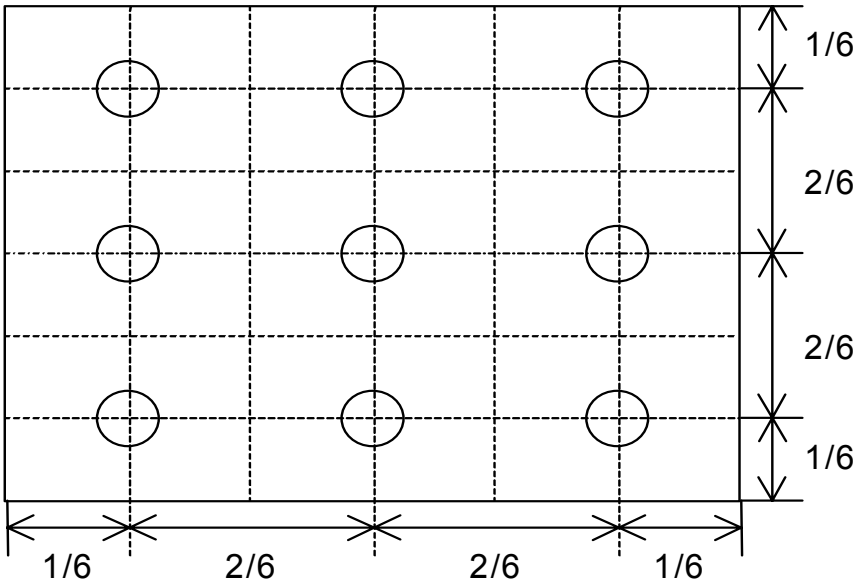
Luminance meter : BM-5A or BM-7 fast(TOPCON)

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.

Note 13-6: Cross Talk (CTK) = $\frac{|YA-YB|}{YA} \times 100\%$

YA: Brightness of Pattern A

YB: Brightness of Pattern B

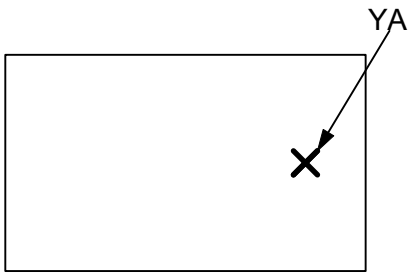
Luminance meter : BM 5A or BM-7 fast (TOPCON)

Measurement distance : 500 mm +/- 50 mm

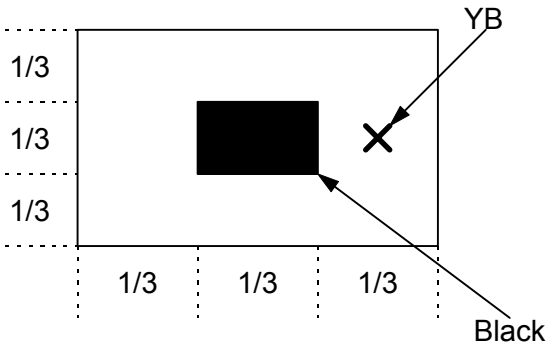
Ambient illumination : < 1 Lux

Measuring direction : Perpendicular to the surface of module

Pattern A
(Gray Level 31)



Pattern B
(Gray Level 31, central black box exclusive)



✕: Measuring Point (A and B are at the same point.)

(Gray Level 0)

14. Handling Cautions

14-1) 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.

14-2) 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.

14-3) 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.

14-4) 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.

14-5) Polarizer mark

The polarizer mark is to describe the direction of wide view angle film how to mach up with the rubbing direction.

15. Reliability Test

*( ):reference only

No	Test Item	Test Condition	Remark
1	High Temperature Storage Test	(Ta = +80℃, 240 hrs)	
2	Low Temperature Storage Test	(Ta = -40℃, 240 hrs)	
3	High Temperature Operation Test	(Ta = +70℃, 240 hrs)	
4	Low Temperature Operation Test	(Ta = -30℃, 240 hrs)	
5	High Temperature & High Humidity Operation Test	(Ta = +60℃, 90%RH, 240 hrs) (No Condensation)	
6	Thermal Cycling Test (non-operating)	-30℃→+80℃, 200 Cycles 30min 30min	
7	Vibration Test (non-operating)	Frequency：10 ~ 55 H_Z, Amplitude：1 mm Sweep time: 11 min 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.

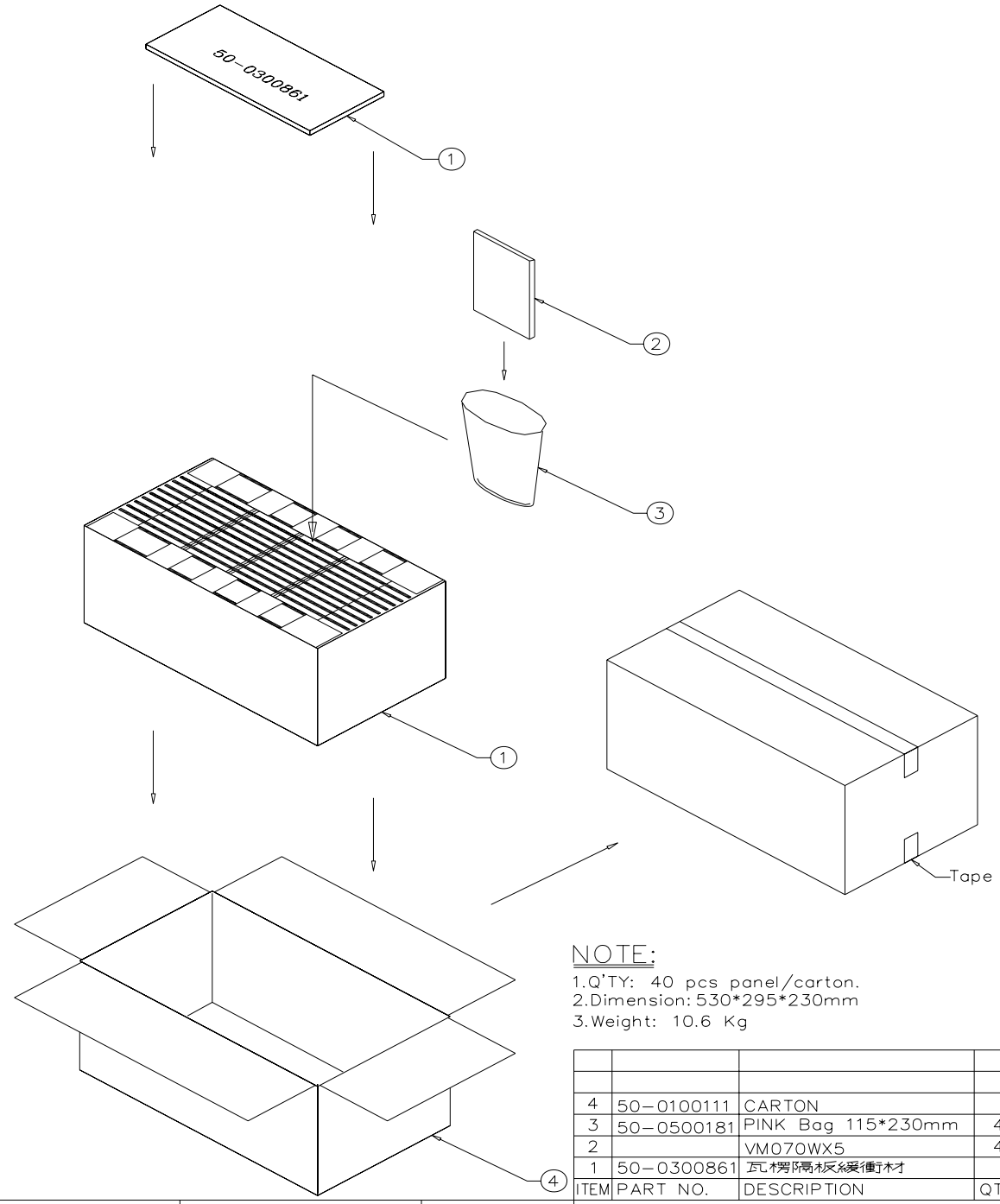
[Criteria]

1. Main LCD should normally work under the normally condition no defect of function ,screen quality and appearance (including : mura ,line defect ,no image)

2. After the vibration and shock test , can't be found chip broken.

16. Packing Diagram

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	50-0500181	PINK Bag 115*230mm	40	抗靜電
2		VM070WX5	40	
1	50-0300861	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	Frank Shin	07.10.12			1 OF 1	VM070WX5 Packing
CHECK	Frank Shin	07.10.12				
DRAWN	Stevenc	07.10.12	MTL.NO.		DWG FILE:	REV. 01 / A4 SIZE