
TECHNICAL SPECIFICATION CONTENTS

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1.Application

This data sheet applies to a color TFT LCD module, PD035VX7 The module applies to OA product, GPS, which require high quality flat panel display. If you must use in high reliability environment can't over reliability test condition. If you use PD035VX7, Prime View advises your system sides must use PVI-2002A(2005/8 new product change to PVI-2003A) which one generates signal to control PD035VX7

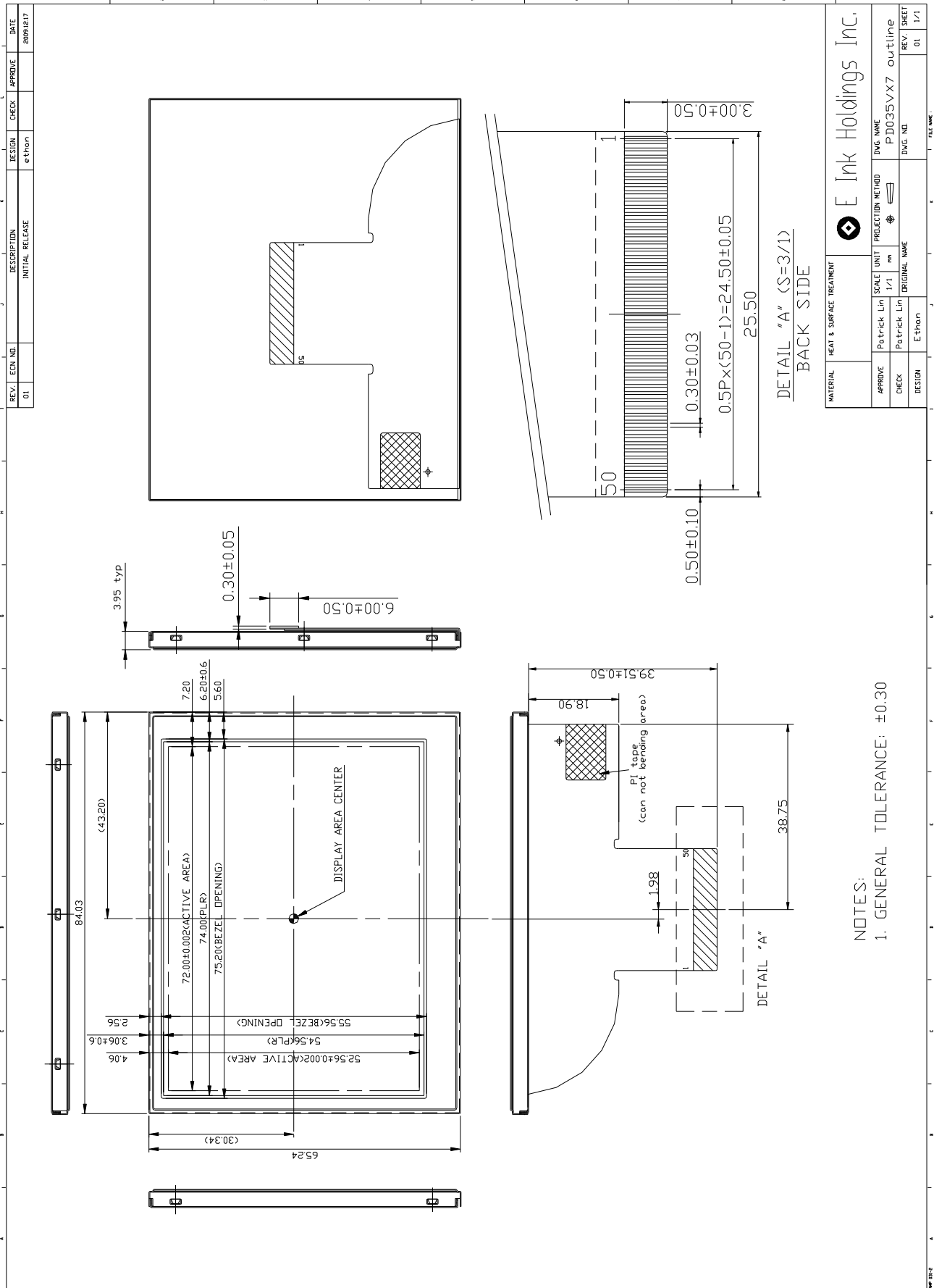
2. Features

- . Amorphous silicon TFT LCD panel with LED back-light unit
- . Pixel in stripe configuration
- . Display Colors : 262,144 colors
- . Optimum Viewing Direction : 6 o'clock

3.Mechanical Specifications

Parameter	Specifications	Unit
Screen Size	3.5 (diagonal)	inch
Display Format	640×(R, G, B)×480	dot
Display Colors	262,144	
Active Area	72 (H)×52.56 (V)	mm
Pixel Pitch	0.1125 (H)×0.1095 (V)	mm
Pixel Configuration	Stripe	
Outline Dimension	84.03 (W)×65.24 (H)×3.95 (D) (Typ.)	mm
Back-light	8-LED	
Weight	40±5	g
Surface treatment	Anti-Glare	
Display mode	Normally white	
Gray scale inversion direction	6 o'clock [ref to Note 13-2]	

4.Mechanical Drawing of TFT-LCD Module



REV.	ECN NO.	DESCRIPTION	DESIGN	CHECK	APPROVE	DATE
01		INITIAL RELEASE	E.thon			20091217

MATERIAL		HEAT & SURFACE TREATMENT		E Ink Holdings Inc.	
APPROVE	Patrick Lin	SCALE	1/1	PROJECTION METHOD	PD035VX7 outline
CHECK	Patrick Lin	UNIT	mm	DWG NO.	
DESIGN	E.thon	ORIGINAL NAME		REV	SHEET
				01	1/1

NOTES:
1. GENERAL TOLERANCE: ±0.30

5.Input / Output Terminals

TFT-LCD Panel Driving

Pin No.	Symbol	I/O	Function	Remark
1	DIO1	I/O	Horizontal Start Pulse Signal Input or Output 1	Note5-3
2	VSS2	I	Ground	
3	VDD1	I	Power Supply	
4	CLK	I	Horizontal Shift Clock	
5	R/L	I	Left/Right Selection	Note 5-3
6	R0	I	Red Data (LSB)	
7	R1	I	Red Data	
8	R2	I	Red Data	
9	R3	I	Red Data	
10	R4	I	Red Data	
11	R5	I	Red Data (MSB)	
12	VSS2	I	Ground	
13	G0	I	Green Data (LSB)	
14	G1	I	Green Data	
15	G2	I	Green Data	
16	G3	I	Green Data	
17	G4	I	Green Data	
18	G5	I	Green Data (MSB)	
19	B0	I	Blue Data (LSB)	
20	B1	I	Blue Data	
21	B2	I	Blue Data	
22	B3	I	Blue Data	
23	B4	I	Blue Data	
24	B5	I	Blue Data (MSB)	
25	LD	I	Load output signal	Note5-7
26	REV	I	Data invert control	Note5-8
27	POL	I	Polarity selection	Note5-9
28	DIO2	I/O	Horizontal Start Pulse Signal Input or Output	Note5-3
29	VSS2	I	Ground	
30	V3	I	Gamma Voltage 3	Note5-10
31	V5	I	Gamma Voltage 5	Note5-10
32	V7	I	Gamma Voltage 7	Note5-10
33	V8	I	Gamma Voltage 8	Note5-10
34	V10	I	Gamma Voltage 10	Note5-10
35	V12	I	Gamma Voltage 12	Note5-10
36	VSS2	I	Ground	
37	VDD2	I	Voltage for analog circuit	Note5-10
38	VCOM	I	Common Voltage	
39	OE	I	Output Enable	Note5-5
40	U/D	I	Up/Down Selection	Note5-6
41	CKV	I	Vertical Shift Clock	Note5-4
42	STVU	I/O	Vertical Shift Pulse Signal Input or Output	Note5-6
43	STVD	I/O	Vertical Shift Pulse Signal Input or Output	Note5-6
44	VGG	I	Gate On Voltage	Note5-1
45	VSS1	I	Ground	
46	VCC	I	Voltage for logic circuit	
47	VEE	I	Gate Off Voltage	Note5-2
48	VLED	-	Supply voltage for LED backlight	
49	GLED2	-	Ground for LED backlight	
50	GLED1	-	Ground for LED backlight	

Note 5-1 $V_{GG} = +17V$.

Note 5-2 $V_{EE} = -10V$.

Note 5-3: 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 5-4: Gate driver shift clock

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

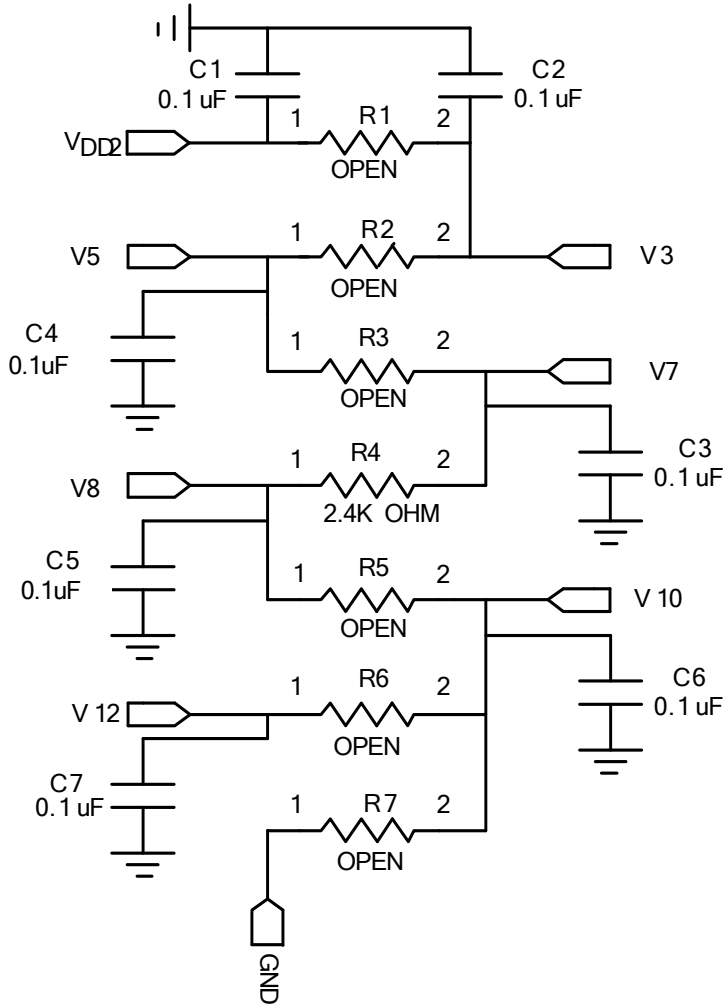
Note 5-6: Select up or down shift

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

Note 5-7 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 5-8 Control whether the Data R0~G5 are inverted or not. (PVI suggests connecting to GND)
When “REV=1”, these data will be inverted.
EX: “00”→”3F”, “07”→”38”, “15”→”2A”

Note 5-9: 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.



6. Absolute Maximum Ratings:
 $V_{SS1}=V_{SS2}=GND=0V, T_a=25^{\circ}C$

Parameters	Symbol	MIN.	MAX.	Unit	Remark
Supply Voltage	V_{DD1}	-0.5	5.0	V	
	V_{CC}	-0.3	5.0	V	
	V_{DD2}	-0.5	12.0	V	
	V_{GG}	-0.3	40.0	V	
	$V_{GG}-V_{EE}$	-	40.0	V	
	V_{EE}	-20	0.3	V	
Storage Temperature	T_{st}	-30	+80	$^{\circ}C$	
Operation Temperature	T_{op}	-30	+70	$^{\circ}C$	

7. Electrical Characteristics
7-1) Recommended Operating Conditions:
 $T_a = 25^{\circ}C$

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply Voltage for Source Driver	V_{DD1}	3.0	3.3	3.6	V	
	V_{DD2}	9.5	10	10.5	V	
Supply Voltage for Gate Driver	V_{GG}	-	17	-	V	
	V_{EE}	-	-10	-	V	
	V_{CC}	3.0	3.3	3.6	V	
Supply Voltage for V_{com}	V_{com}	-	2.7	-	V	
Digital Input Voltage	V_{IH}	$0.8V_{DD1}$	-	V_{DD1}	V	
	V_{IL}	0	-	$0.2V_{DD1}$	V	

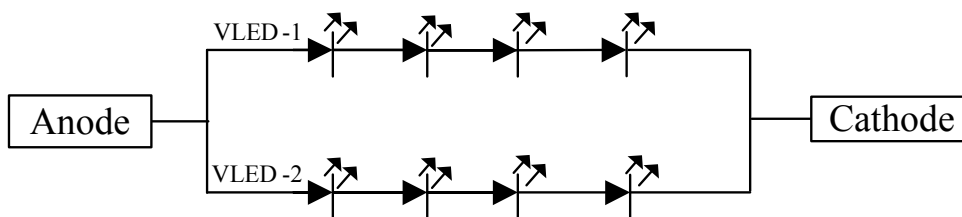
7-2) Recommended driving condition for LED backlight
 $T_a = 25^{\circ}C$

Parameter	Symbol	Min	TYP	MAX	Unit	Remark
Supply voltage of LED backlight	V_{LED}	-	-	(14.4)	V	Note 7-1
Supply current of LED backlight	I_{LED1}	-	20	-	mA	Note 7-2
	I_{LED2}	-	-	-	-	-
Backlight Power Consumption	P_{LED}	-	-	576	mW	Note 7-3

 Note 7-1 $I_{LED}=20mA$, Constant Current

Note 7-2 : The LED driving condition is defined for each LED module. (4 LED Serial)

 Input current = $20mA * 2 = 40mA$

 Note 7-3 : $P_{LED} = V_{LED} * I_{LED1} + V_{LED} * I_{LED2}$.


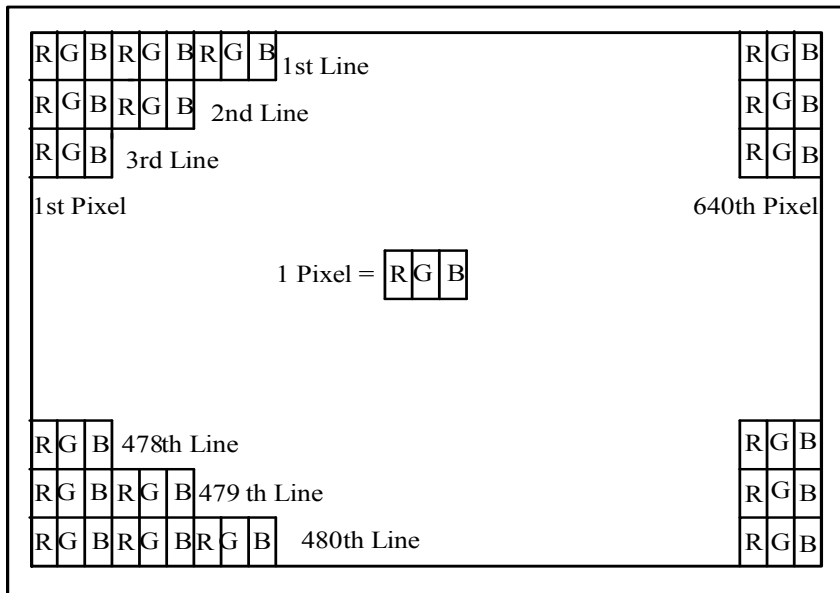
7-3) Power Consumption

GND = 0 V , Ta = 25°C

Parameter	Symbol	Condition	Typ.	Max.	Unit	Remark
Supply Current for Gate Driver (Hi level)	I _{GG}	V _{GG} =+17V	0.12	0.15	mA	
Supply Current for Gate Driver (Low level)	I _{EE}	V _{EE} =-10V	0.15	0.19	mA	
Supply Current for Source Driver (Digital)	I _{DD1}	V _{DD1} =+3.3V	4.8	8.0	mA	
Supply Current for Source Driver (Analog)	I _{DD2}	V _{DD2} =+10V	28.0	38.0	mA	
Supply Current for Gate Driver (Digital)	I _{CC}	V _{CC} =+3.3V	0.17	0.21	mA	
LCD Panel Power Consumption	-	-	300	412	mW	
Backlight Power Consumption	P _{LED}	-	-	576	mW	
Total Power Consumption	-	-	-	988	mW	

8. Pixel Arrangement

The LCD module pixel arrangement is the stripe.

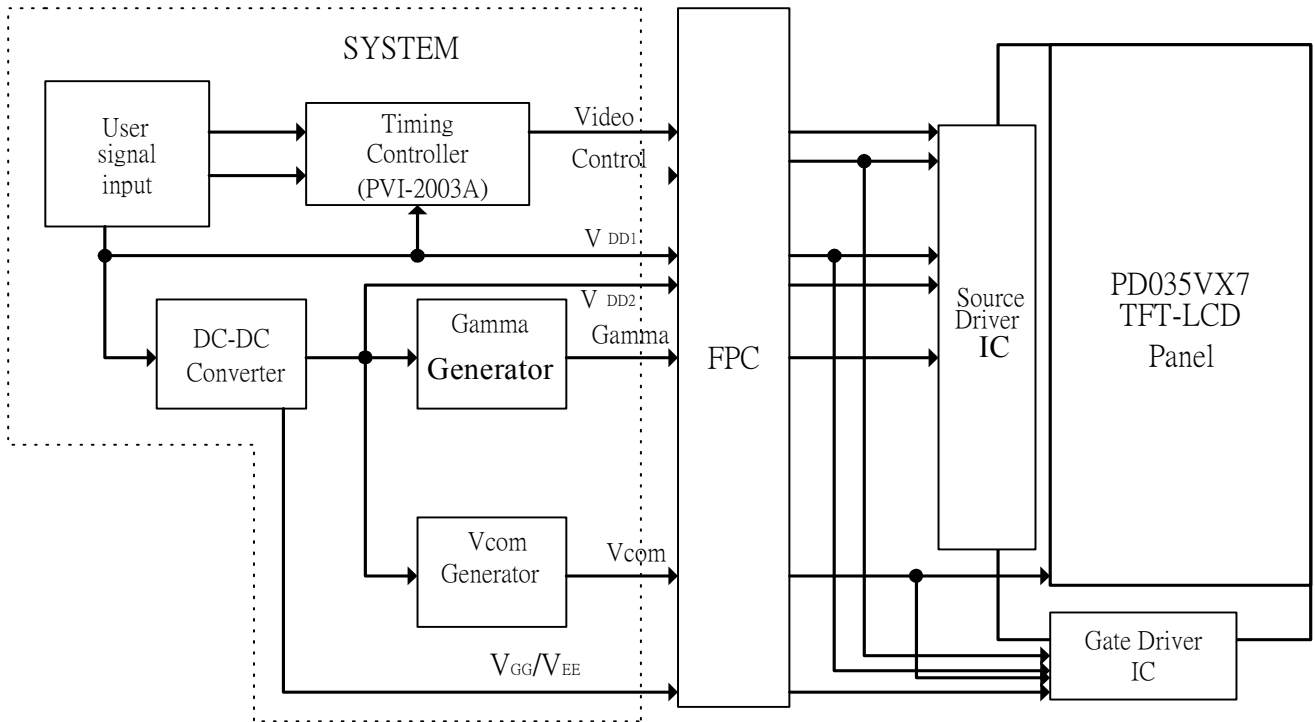


9. Display Color and Gray Scale Reference

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 PD035VX7, you must apply PVI-2003A(Timing controller) which Will generate signal to support PD035VX7.

11. Interface Timing

11.1) Timing Parameters

AC Electrical Characteristics ($V_{CC}=V_{DD1}=3.3V$, $V_{DD2}=10V$, $GND=V_{SS1}=V_{SS2}=0V$, $T_a=25^{\circ}C$)

Parameter	Symbol	Min.	Typ.	Max.	Unit
CLK Frequency	Fclk	-	25	40	MHz
CLK Pulse Width	T _{CPH}	25	40	-	ns
Data Set-up Time	T _{SU}	4	-	-	ns
Data Hold Time	T _{HD}	2	-	-	ns
Propagation Delay of DIO2/1	T _{PHL}	6	10	15	ns
Time That The Last Data to LD	T _{LD}	1	-	-	T _{CPH}
Pulse width of LD	T _{WLD}	2	-	-	T _{CPH}
Time That LD to DIO1/2	T _{LDS}	5	-	-	T _{CPH}
POL Set-up Time	T _{PSU}	6	-	-	ns
POL Hold Time	T _{PHD}	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 _{HVD}	400	-	-	ns
Horizontal Display Period	T _{HDP}	-	640	-	T _{CPH}
Horizontal Period Timing Range	T _{HP}	-	800	-	T _{CPH}
Horizontal Lines Per Field	T _V	520	525	640	T _{HP}
Vertical Display Timing Range	T _{DV}	-	480	-	T _{HP}



11.2) Timing Diagram

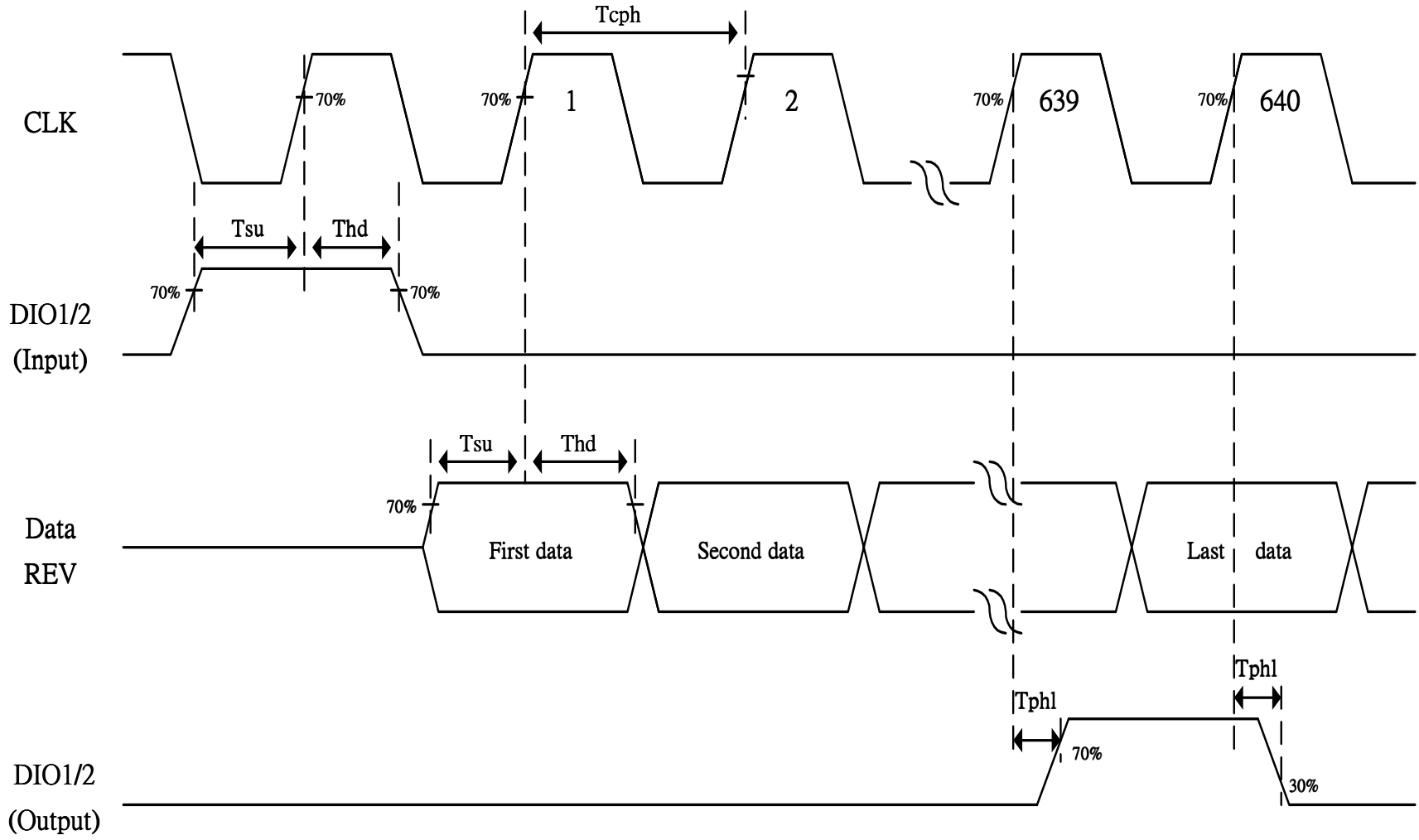


Fig. 11-1 Horizontal timing(1)

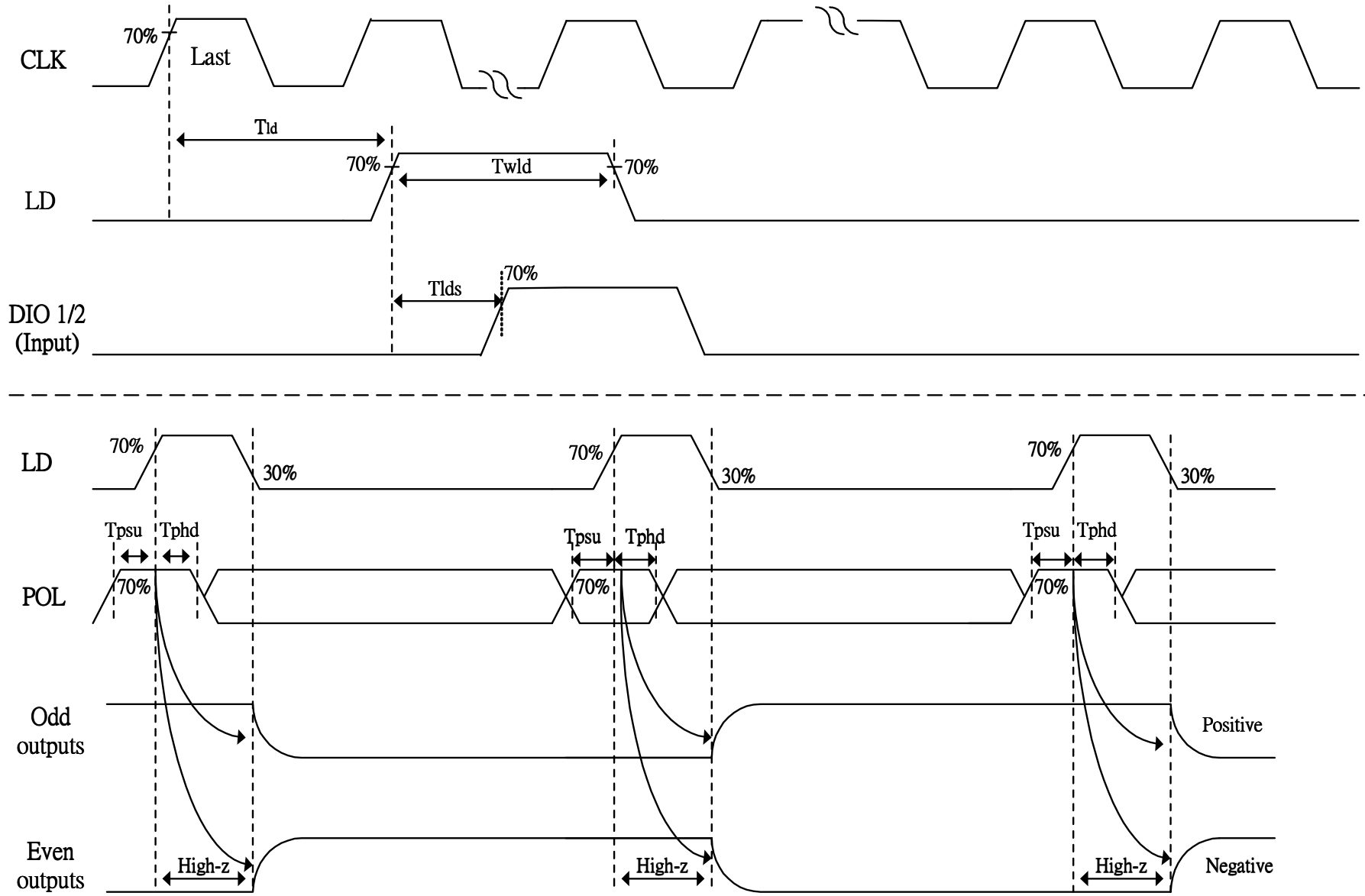


Fig. 11-2 Horizontal timing(2)

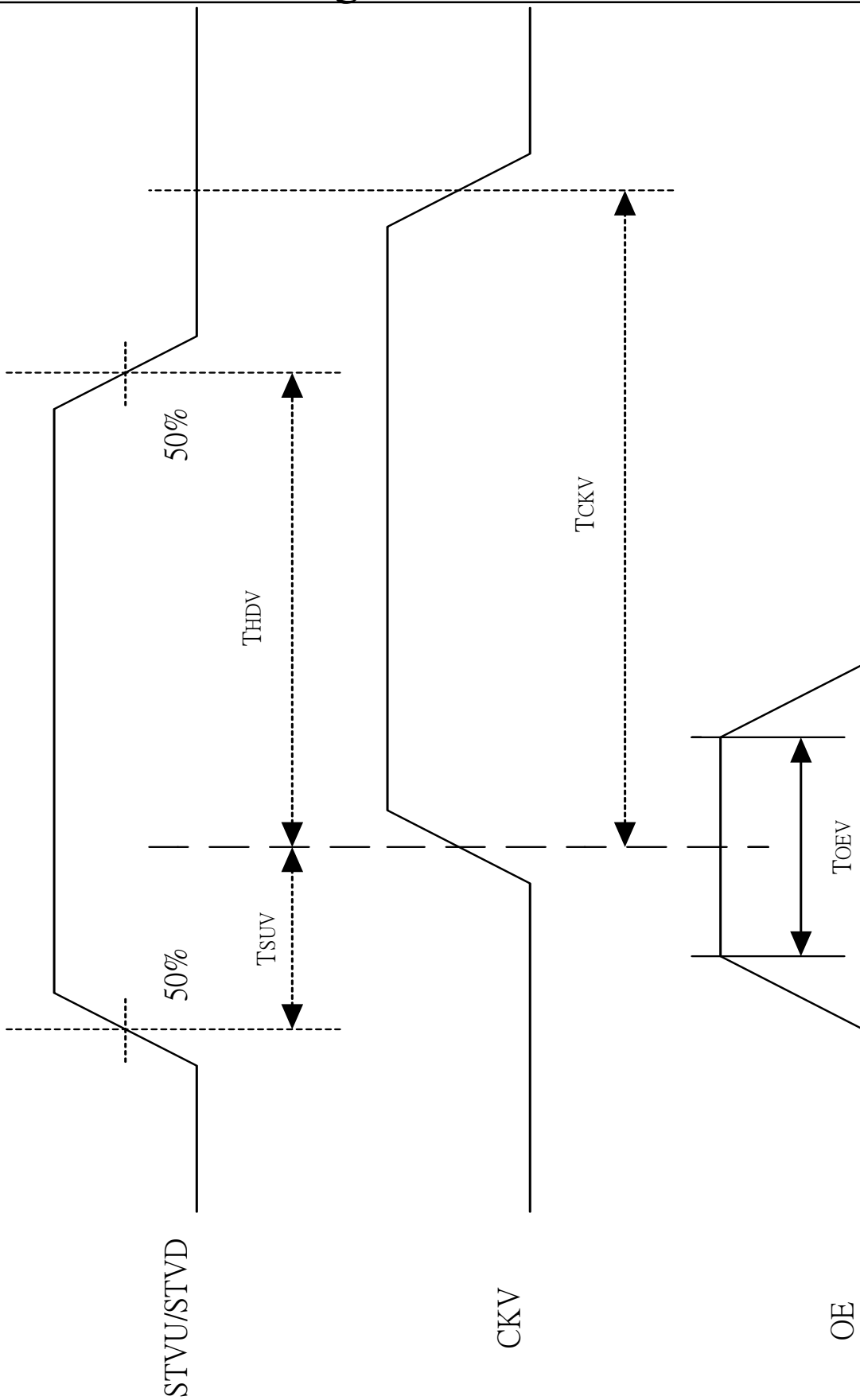


Fig. 11-3 Vertical shift clock timing

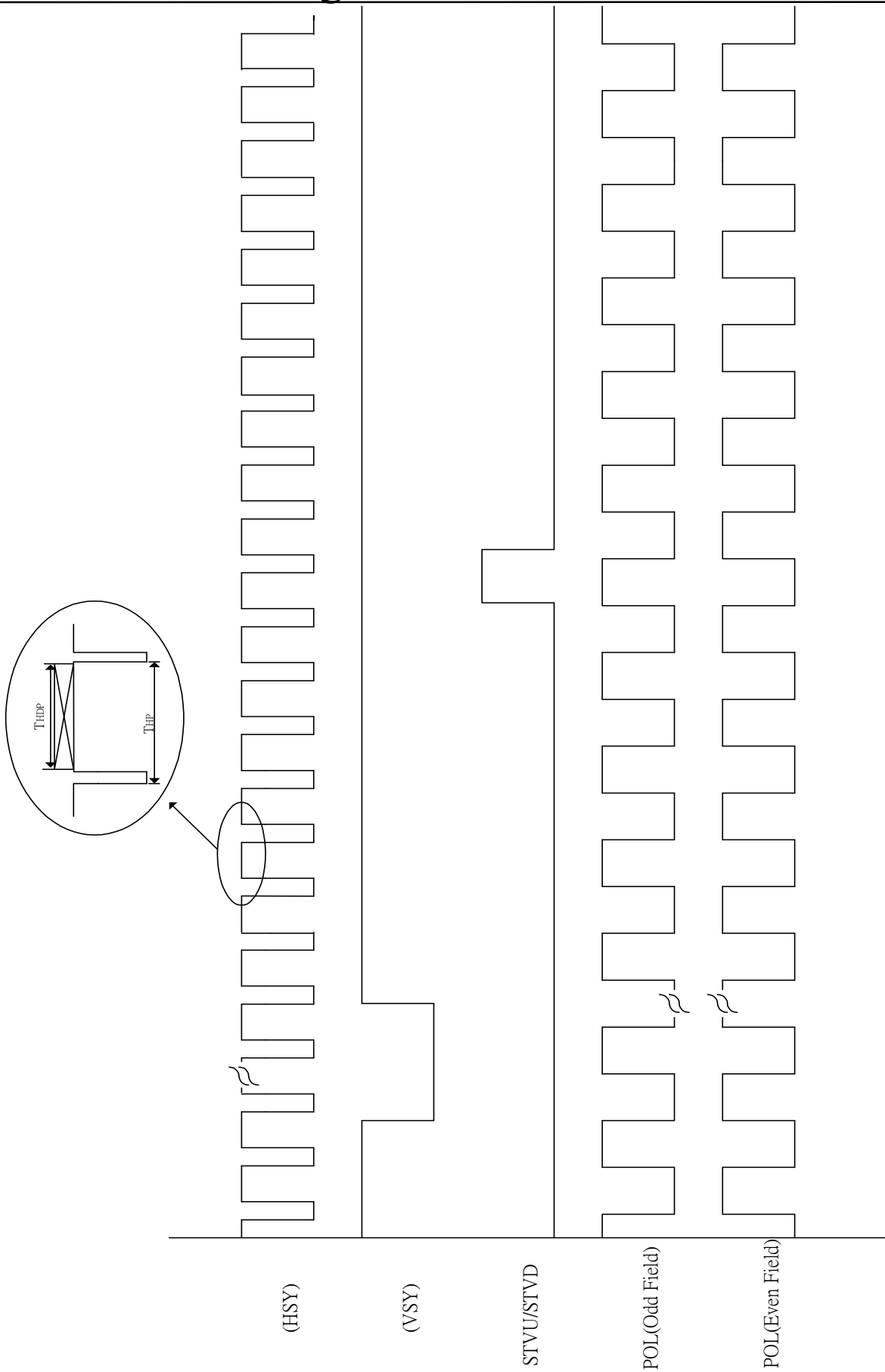
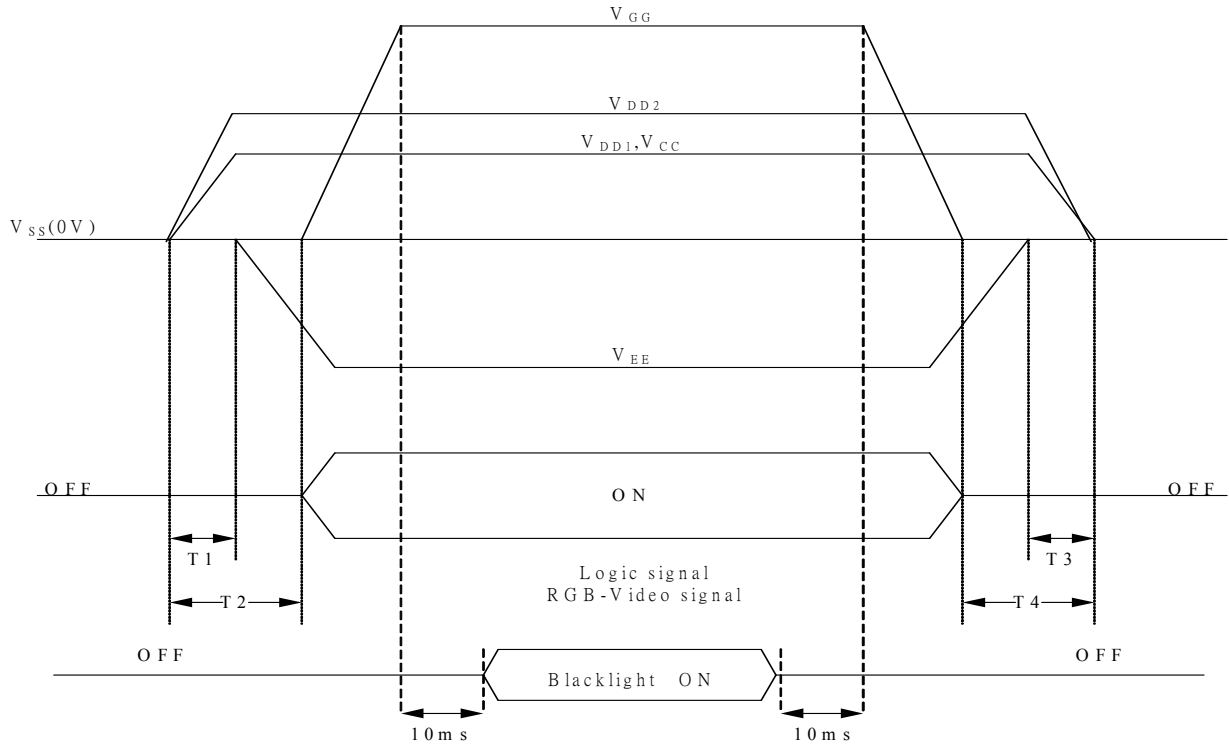


Fig. 11-4 Vertical timing

12. Power On Sequence



- 1) $10\text{ms} \leq T_1 < T_2$
- 2) $0\text{ms} < T_3 \leq T_4 \leq 10\text{ms}$

13. Optical Characteristics

13-1) Specification:

Ta=25°C

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ_{21}, θ_{22}	CR≥10	45	50	-	deg	Note 13-2
	Vertical	θ_{12} (to 12 o'clock)		10	15	-	deg	
		θ_{11} (to 6 o'clock)		30	35	-	deg	
Contrast Ratio		CR	Optimum direction	400	500	-	-	Note 13-4
Response time	Rise	Tr	$\theta = 0^\circ$	-	15	30	ms	Note 13-3
	Fall	Tf		-	25	50	ms	
Brightness		L	$\theta = 0^\circ$	450	550	-	cd/m ²	Note 13-1
Uniformity		U	$\theta = 0^\circ$	70	75	-	%	Note 13-5
Cross Talk		-	$\theta = 0^\circ$	-	-	3.5	%	Note 13-6
White Chromaticity		x	-	0.26	0.31	0.36	-	Note 13-1
		y	-	0.29	0.34	0.39	-	
LED Life Time		-	Ta=25°C	15000	20000	-	hrs	Note 13-7

