Doc. Number:

■ Tentative Specification

□ Preliminary Specification

□ Approval Specification

MODEL NO: YH123IB50

SUFFIX: 48A(1)

Customer:

APPROVED BY SIGNATURE

Name / Title _____ _____

Note :

_____

Please return 1 copy for your confirmation with your signature and comments.

Approved By	Checked By	Prepared By
		MW Chen

PRODUCT SPECIFICATION

REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0	-	Initial Release	2022.12.12	

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

12.3inch module is a color active matrix TFT LCD module using amorphous silicon TFT‘ s (Thin Film Transistors) as an active switching devices. It is a transmissive type display operating in the normal black. The TFT-LCD has a 12.3 inch diagonally measured active area with resolutions (1920 horizontal by 720 vertical pixel arrays). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this panel can display 16.7M colors.

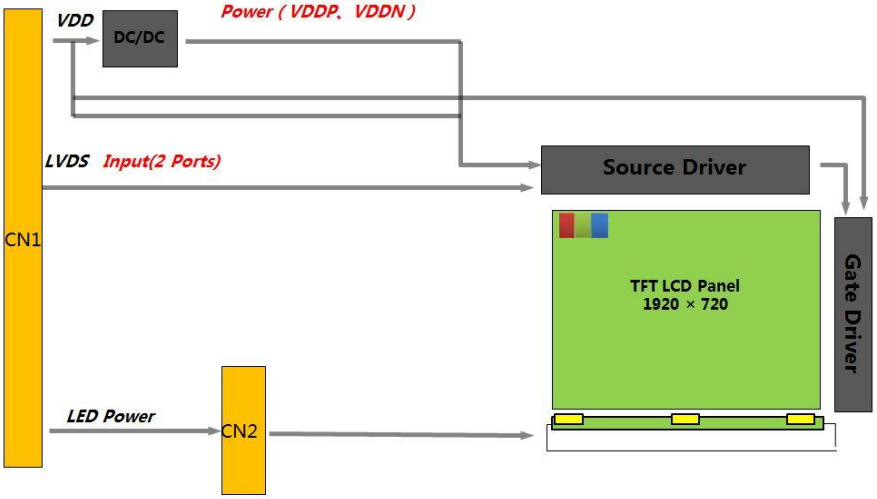


Figure 1-1 Block Diagram

1.2 Features

- Wide viewing angle (U/D/L/R)：88/88/88/88
- Color Gamut：70% Typ. On C-light
- Cell thickness：1.0t
- LVDS Interface

1.3 Application

- **Vehicle-mounted Production**

1.4 General Specification

<Table 1-1 General Specifications>

Parameter	Specification	Unit	Remarks
Active area	292.032 (H) × 109.512 (V)	mm	8 : 3
Number of pixels	1920(H) ×720(V)	pixels	
Pixel pitch	0.1521(H) ×RGB ×0.1521 (V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.7M	colors	
Color gamut	70%	%	C-light Typ.
Display mode	Normally black		
Viewing Direction (Human Eye)	U/D/L/R Min 80/80/80/80 Typ 88/88/88/88		
Surface Treatment	HC		CF&TFT Pol
Driver IC	3*FL5894 1*ST5086		Single gate 3S+1G

Note:
1.At the U/D/L/R direction, the viewing angle is same;
2.The TFT and CF Align Direction;

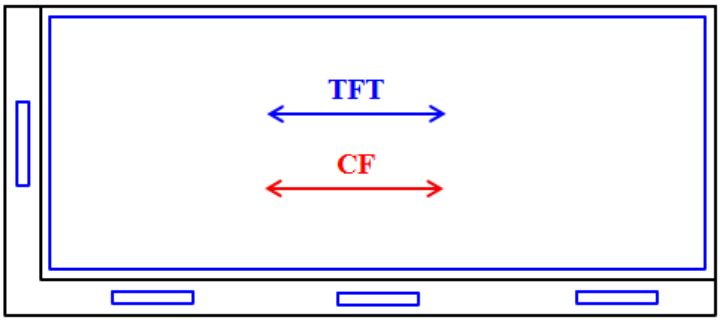


Figure 1-2 The TFT and CF Align Direction

2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2-1

< Table 2-1 Environment Absolute Maximum Ratings>

Parameter	Symbol	Min.	Max.	Unit	Remarks
LC operating Voltage *1)	V_{OP}	-	5.7	V	Ta=25+/-2°C
Operating Temperature (Humidity)	T_{OP}	-30	+80	℃	
	RH	-	90	%	At 60°C
Storage Temperature (Humidity)	T_{ST}	-30	+85	℃	
	RH	-	90	%	At 60°C

*1)Liquid Crystal driving voltage
Due to the characteristics of LC Material, this voltage varies with environmental temperature.

3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

Ta=25+/-2°C

Parameter	Symbol	Values			Unit	Notes
		Min	Typ.	Max		
Voltage of VCC		3	-	3.6	V	
Current of VCC			350	550	mA	

Notes :
1: AVDD should be set to satisfy the characteristic of LC .
2: VGH should be set to satisfy charging ratio of TFT pixel.
3 : VCOM should be adjusted to make the flicker level be minimum and optimize display quality.
4: Frame rate=60HZ

4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. The center of the measuring spot on the Display surface shall stay fixed.

The backlight should be operating for 30 minutes prior to measurement.

<Table 4-1 Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	80	88	-	Deg.	Note 1
		Θ_9		80	88	-	Deg.	
	Vertical	Θ_{12}		80	88	-	Deg.	
		Θ_6		80	88	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle	-	1000	-		
White luminance uniformity		ΔY		-	-	-	%	Note 4
NTSC		%		-	70%	-	%	@ c-light
Transmittance		Tr.		3.25	3.65		%	@ c-light
White Chromaticity		x_w		Typ-0.03	0.296	Typ+0.03	-	TBD, update after locking spec Note 5
		y_w			0.334		-	
Reproduction of color	Red	x_R			0.650		-	
		y_R			0.328		-	
	Green	x_G			0.330		-	
		y_G			0.625		-	
	Blue	x_B			0.146		-	
		y_B			0.058		-	
Response Time (Rising / Falling)		T_{RT}	25℃ -20℃ -30℃	-	-	30 250 500	ms	Note 6

Parameter	Condition	Min.	Typ.	Max.	Remark
Flicker	25℃	-	-	10%	@L127
Gamma	25℃	1.9	2.2	2.5	

Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface.
2. Contrast measurements shall be made at viewing angle of θ= 0° and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See FIGURE 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Center trans of white is defined as the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 4 for a total of the measurements per display.
4. The White luminance uniformity on LCD surface is then expressed as :
   ΔY = (Minimum Luminance of 9points / Maximum Luminance of 9points) * 100
5. The color chromaticity coordinates specified in Table 4. shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurement condition is C - light source.
6. The electro-optical response time measurements shall be made as FIGURE 5 shown in Appendix by switching the "data" input signal ON and OFF. The times needed for the transmittance to change from 10% to 90% is Tr, and 90% to 10% is Tf.

5.0 OPTICAL TEST APPENDIX

Figure 5-1 The Definition of Vth & Vsat

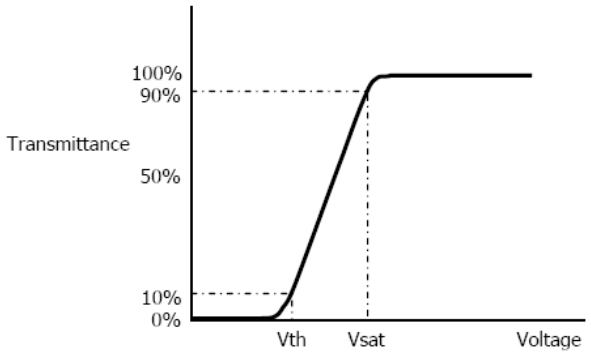


Figure 5-2 Measurement Set Up

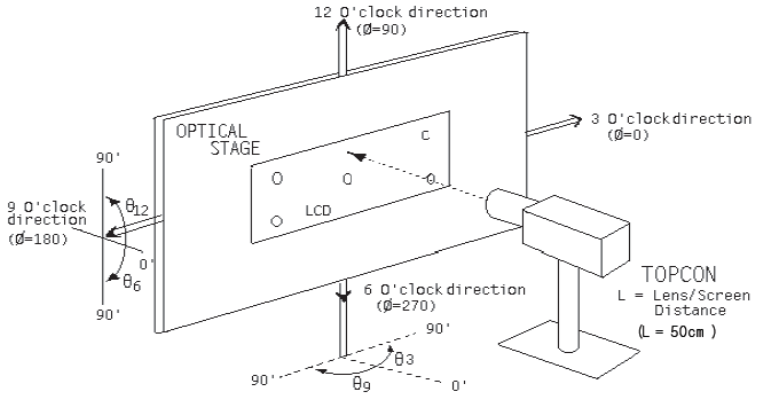
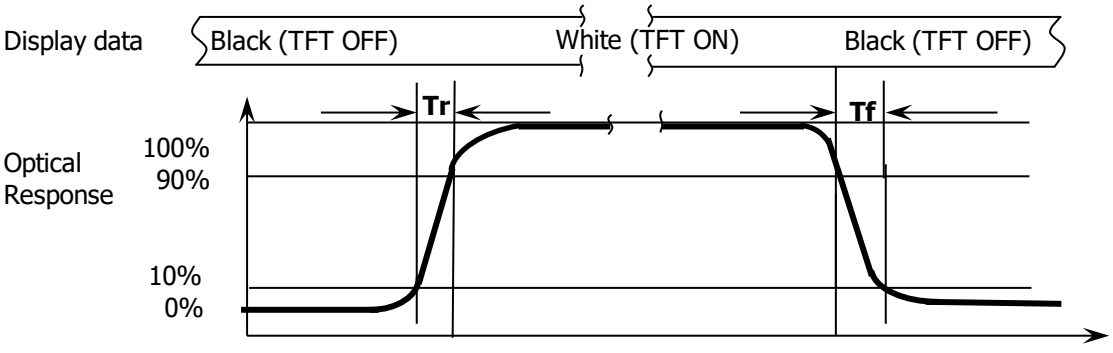


Figure 5-3 Response Time Testing



6.0 MECHANICAL CHARACTERISTICS

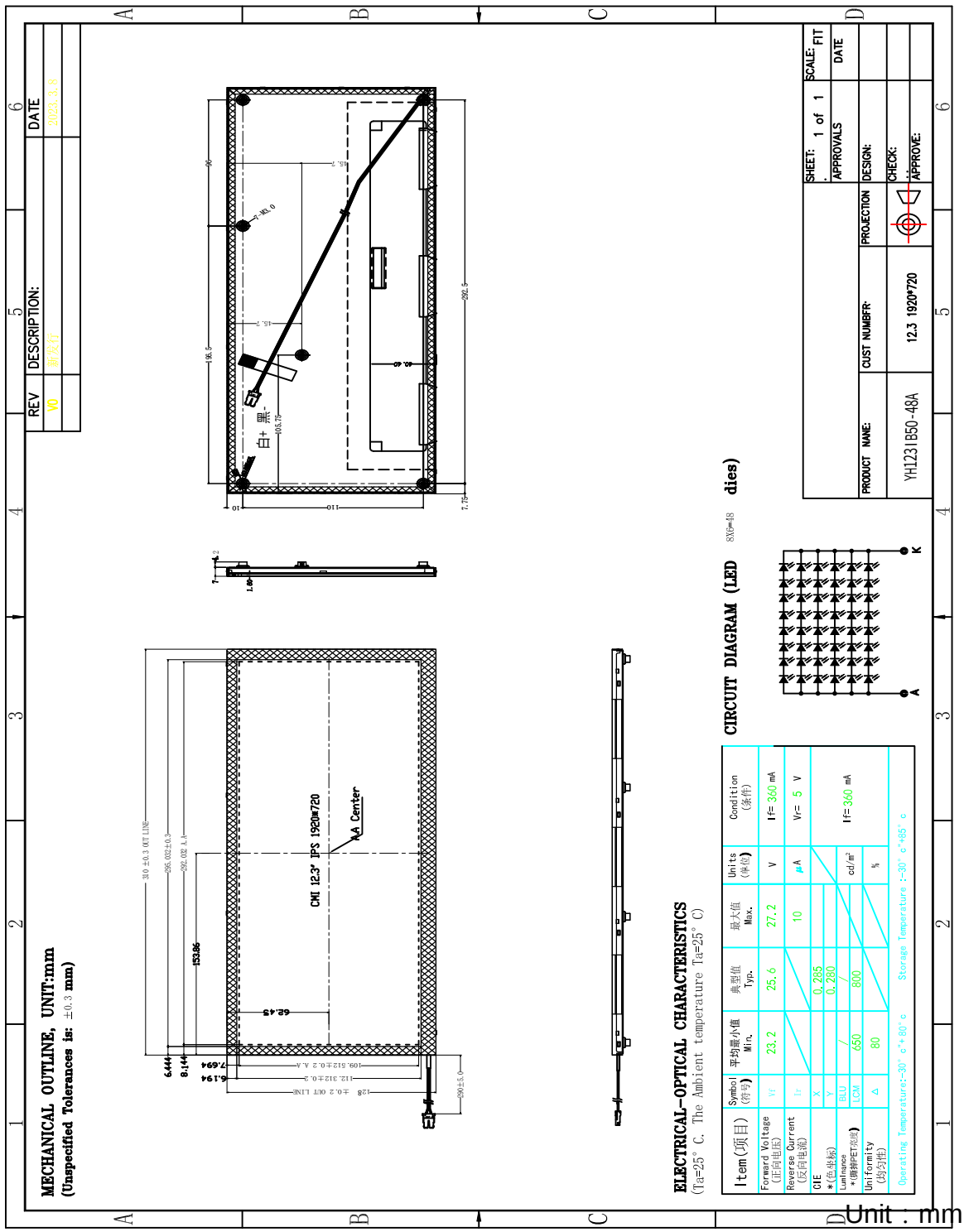
6.1 Dimensional Requirements

Figure in next page shows mechanical outlines for the panel

<Table 6-1 Dimensional Parameters>

Parameter	Specification	Unit
Active Area	292.032 (H) × 109.512 (V)	mm
Number of pixels	1920(H) × 720(V)	Pixels
Pixel pitch	0.1521(H) ×RGB×0.1521 (V)	mm
Pixel arrangement	RGB Vertical stripe	
Display colors	16.7M	colors
Display mode	Normally black	
FOB thickness	1.24	mm
FOG outline	300.2x119.7	mm
Outline Dimension	310(H)*128(V)*7(T)	mm

7.0 MDL Outline Dimension



Item (项目)	Symbol (符号)	平均最小值 Min.	典型值 Typ.	最大值 Max.	Units (单位)	Condition (条件)
Forward Voltage (正向电压)	Vf	23.2	25.6	27.2	V	If= 360 mA
Reverse Current (反向电流)	Ir			10	μA	Vr= 5 V
CIE *(色坐标)	X		0.285			If= 360 mA
	Y		0.280			
Luminance *(侧视PET测试)	BLU	/	/		cd/m²	
	LCM	650	800			
Uniformity (均匀性)	Δ	80			%	

Operating Temperature:-30° c~80° c Storage Temperature :-30° c~85° c

Unit : mm

8.0 RELIABILITY TEST

<Table 8-1 Reliability test>

	Item	Unit	Required	Remark
1	运行温度	℃	-30℃~+80℃,240hrs	
2	存储温度	℃	-30℃~+85℃,240hrs	
3	ESD	KV	Air Voltage:± 6KV Contact Voltage:± 4KV R: 330Ω C: 150pF 5 time	Note
4	残像	-	Burn in:5*5 Chess,1h@25C. Inspection Pattern:50% grey, Perpendicular view, after 3min,the mura must disappear	
5	THO（高温高湿工作）	℃	Ta=+50℃, 80%RH, 240hrs	
6	TST（冷热冲击）	℃	-20℃(30min)~+60℃(30min) 100cycles(No Operation)	

Note
Class B，有异常而可恢复，比如闪屏
因为整机ESD水平不仅与模组相关，也与系统相关。此处承诺配合客户整机达到要求，如需要将进行ESD改善。

9.0 INTERFACE CONNECTION

9.1 The LCD Module Electrical Interface Connection

The Recommended connector is 101049-205050

The connector interface pin assignments are listed in Table 9-1

Table 9-1 Pin Assignments for the LCD Connector

PIN	SYMBOL	Description	Remark
1	**NC**	NO CONNECTION	BOE for VDDOTP
2	**GND**	Ground	
3	**GND**	Ground	
4	**GND**	Ground	
5	NC	NO CONNECTION	
6	VDD	Power Supply	
7	VDD	Power Supply	
8	VDD	Power Supply	
9	NC	NO CONNECTION	
10	NC	NO CONNECTION	BOE for ATREN
11	GND	Ground	
12	GND	Ground	
13	**ORXIN0-**	LVDS Receiver Signal(-)	
14	**ORXIN0+**	LVDS Receiver Signal(+)	
15	**GND**	Ground	
16	**ORXIN1-**	LVDS Receiver Signal(-)	
17	**ORXIN1+**	LVDS Receiver Signal(+)	
18	**GND**	Ground	
19	**ORXIN2-**	LVDS Receiver Signal(-)	
20	**ORXIN2+**	LVDS Receiver Signal(+)	
21	**GND**	Ground	
22	**ORXCLKIN-**	LVDS Receiver Signal(-)	
23	**ORXCLKIN+**	LVDS Receiver Signal(+)	
24	**GND**	Ground	

PIN	SYMBOL	Description	Remark
25	ORXIN3-	LVDS Receiver Signal(-)	
26	ORXIN3+	LVDS Receiver Signal(+)	
27	GND	Ground	
28	ERXIN0-	LVDS Receiver Signal(-)	
29	ERXIN0+	LVDS Receiver Signal(+)	
30	GND	Ground	
31	ERXIN1-	LVDS Receiver Signal(-)	
32	ERXIN1+	LVDS Receiver Signal(+)	
33	GND	Ground	
34	ERXIN2-	LVDS Receiver Signal(-)	
35	ERXIN2+	LVDS Receiver Signal(+)	
36	GND	Ground	
37	ERXCLKIN-	LVDS Receiver Signal(-)	
38	ERXCLKIN+	LVDS Receiver Signal(+)	
39	GND	Ground	
40	ERXIN3-	LVDS Receiver Signal(-)	
41	ERXIN3+	LVDS Receiver Signal(+)	
42	GND	Ground	
43	STBYB	STBYB Signal	L:Standby H:Normal
44	RESET	RESET Signal	L:Reset H:Normal
45	CSB	SPI Signal	
46	NC	NO CONNECTION	
47	SCL	SPI Signal	
48	SDA	SPI Signal	
49	NC	NO CONNECTION	
50	GND	Ground	

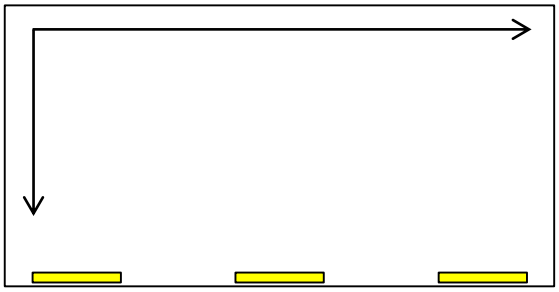


Figure 3-1 Scan direction Setting

10.0 SIGNAL SPECIFICATION

10.1 LVDS Signal Timing

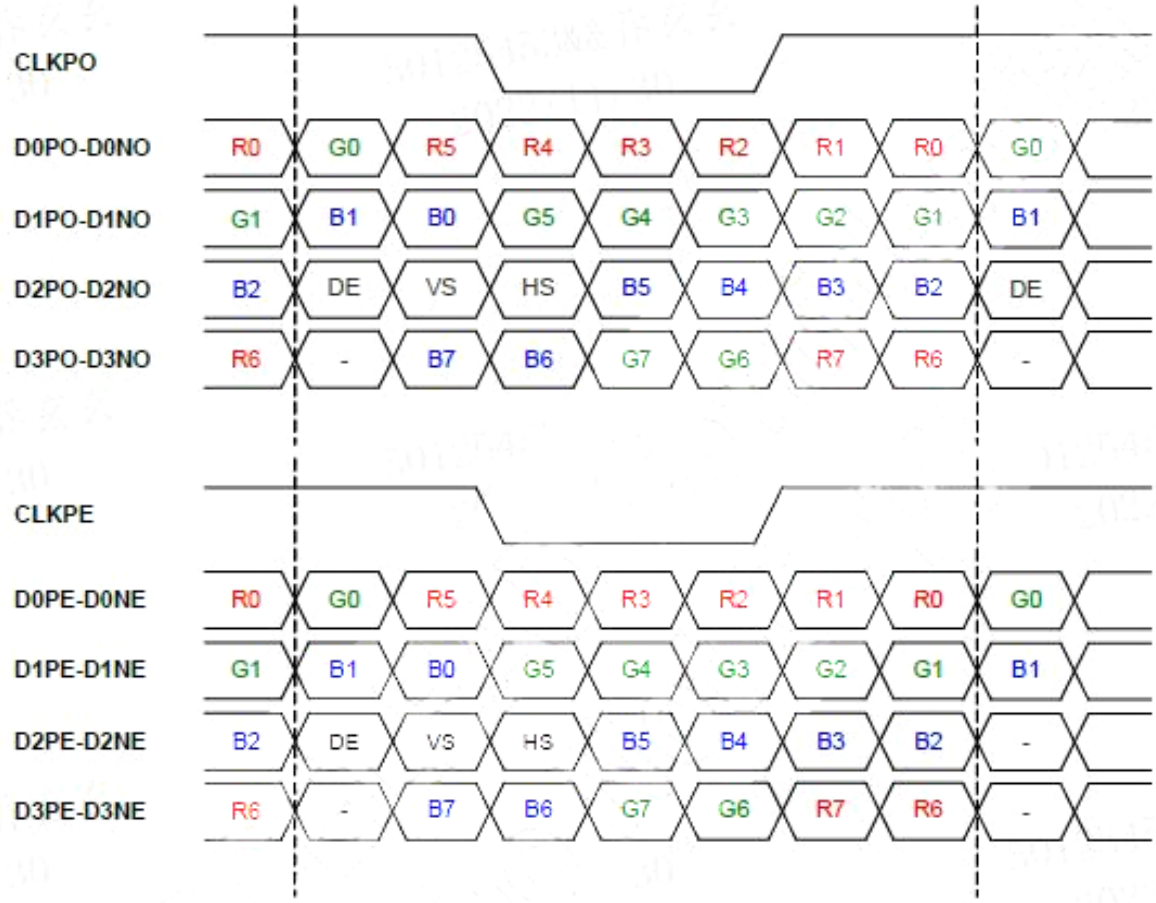
Table 10-1 LVDS Signal Timing(DE Mode)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency	RxFCLK	43.1	45.7	70.1	MHz	Note1
Horizontal Display Area	thd		960		DCLK	
HS Period	th	989	1002	1248	DCLK	
HS Blanking	Thb+thfp		42		DCLK	
Vertical Display Area	tvd		720		TH	
VS Period	tv	727	760	936	TH	
VS Blanking	Tvbp+tvfp		40		TH	
Frame Rate	FR	60	60	60	Hz	
Clock period	TLVCYC	14.28			ns	
Clock high time	TLVCH		4		UI	
Clock low time	TLVCL		3		UI	
LVDS wake-up time	T_{ENLVDS}			150	us	

Note 1: Advise the customer to use the Typ. value

10.2 Signal Format

Table 10-2 2-port LVDS signals, VESA format, 8-bit mode

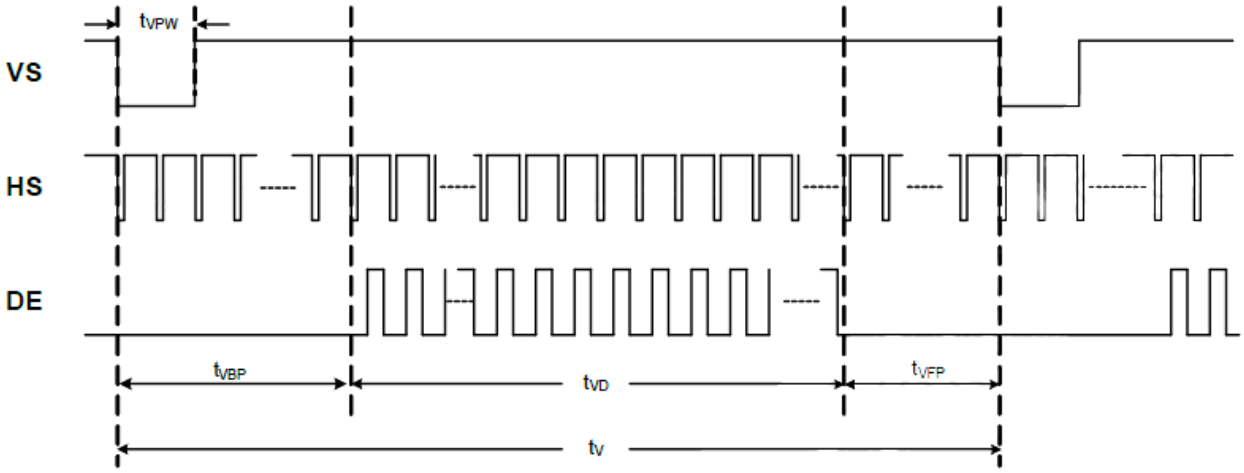


Note:

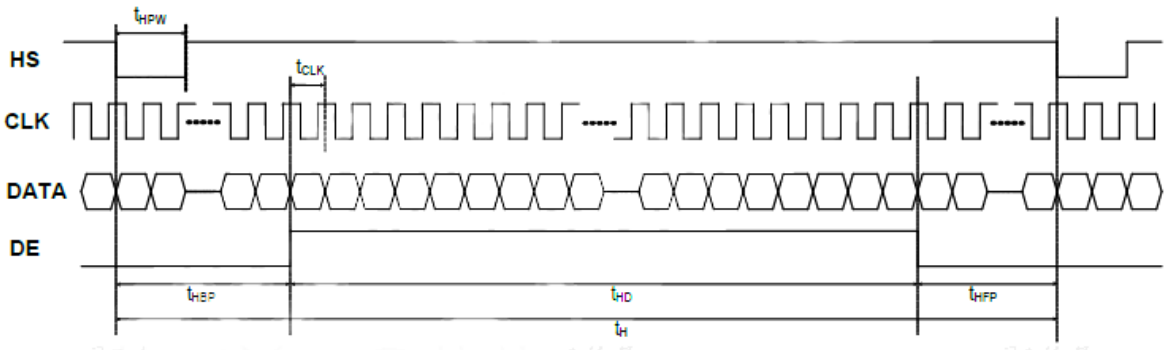
1. For 6 bit mode, MSB are R/G/B[5] and LSB are R/G/B[0]
2. For 8 bit mode, MSB are R/G/B[7] and LSB are R/G/B[0]
3. For single port LVDS only ODD port (CLKxO and DxxO) are used

10.3 Parrllel RGB at DE only mode

Vertical input timing



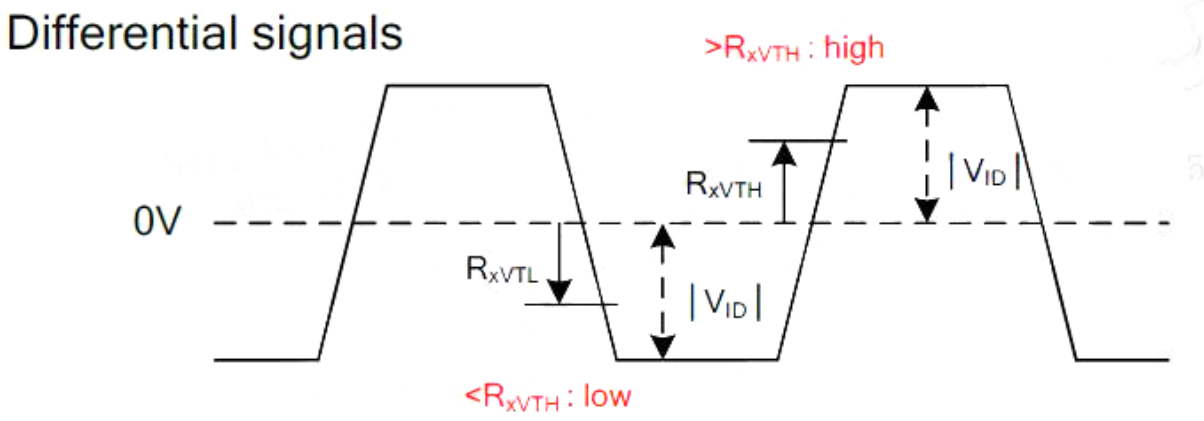
Horizontal input timing



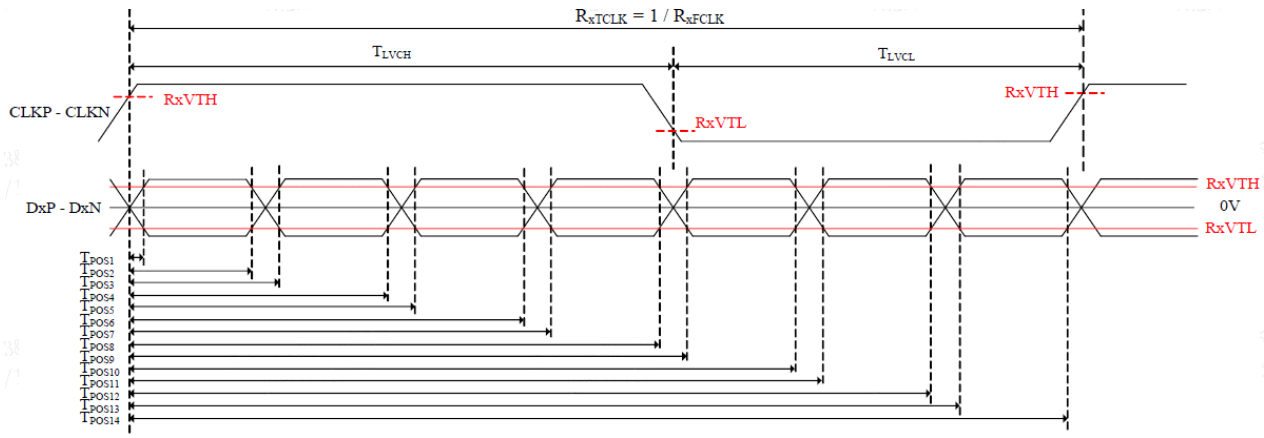
10.4 LVDS DC Characteristics

Table 10-4 LVDS DC Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
Differential input high threshold voltage	R_{xVTH}			0.1	V	RxVCM = 1.2V
Differential input low threshold voltage	R_{xVTL}	-0.1			V	
Input voltage range (singled-end)	R_{xVIN}	0		VDD-1.2	V	
Differential input common mode voltage	R_{xVCM}	0.8	1.2	1.4	V	
Differential input voltage	$\|V_{ID}\|$	0.2	0.4	0.6	V	
Differential input leakage current	RV_{xliz}	-10		10	uA	



10.5 LVDS AC Characteristics

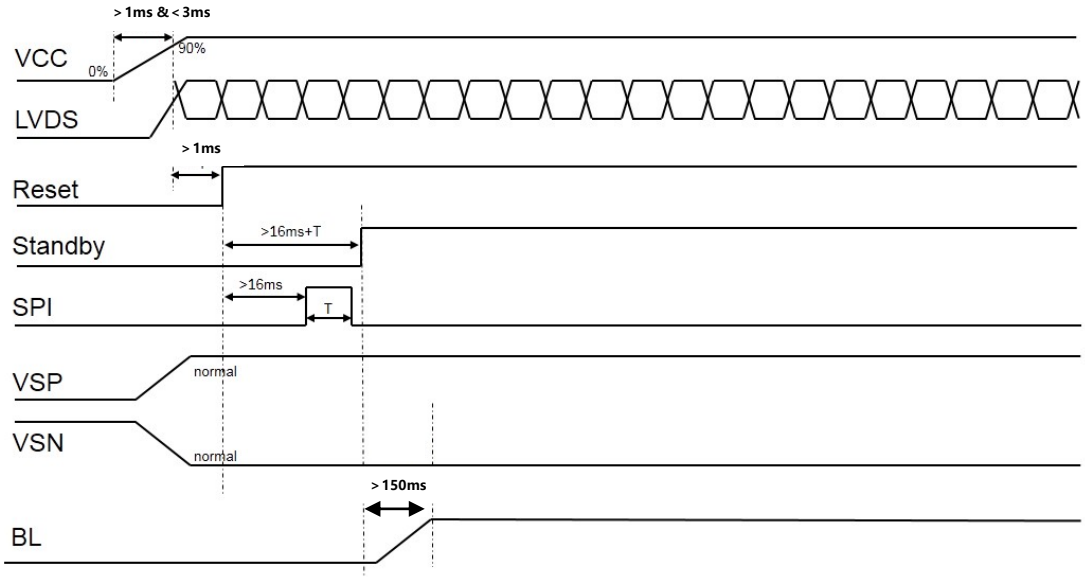


Parameter	Symbol	Min	Typ.	Max.	Unit
Clock Frequency	R_{xFCLK}	20		90	MHz
Clock Period	R_{xTCLK}	11.1		50	ns
1 data bit time	UI	-	1/7	-	R_{xTCLK}
Clock high time	T_{LVCH}		4		UI
Clock low time	T_{LVCL}		3		UI
Position 1	T_{POS1}	-0.25	0	0.25	UI
Position 2	T_{POS2}	0.75	-	1.25	UI
Position 3	T_{POS3}	0.75	1	1.25	UI
Position 4	T_{POS4}	1.75	-	2.25	UI
Position 5	T_{POS5}	1.75	2	2.25	UI
Position 6	T_{POS6}	2.75	-	3.25	UI
Position 7	T_{POS7}	2.75	3	3.25	UI
Position 8	T_{POS8}	3.75	-	4.25	UI
Position 9	T_{POS9}	3.75	4	4.25	UI
Position 10	T_{POS10}	4.75	-	5.25	UI
Position 11	T_{POS11}	4.75	5	5.25	UI
Position 12	T_{POS12}	5.75	-	6.25	UI
Position 13	T_{POS13}	5.75	6	6.25	UI
Position 14	T_{POS14}	6.75	-	7.25	UI
Input eye width	T_{EYEW}	0.5	-	-	UI
Input eye border	T_{EX}	-	-	0.25	UI
PLL wake-up time	TenPLL			150	us

Table 10-5 LVDS AC Characteristics

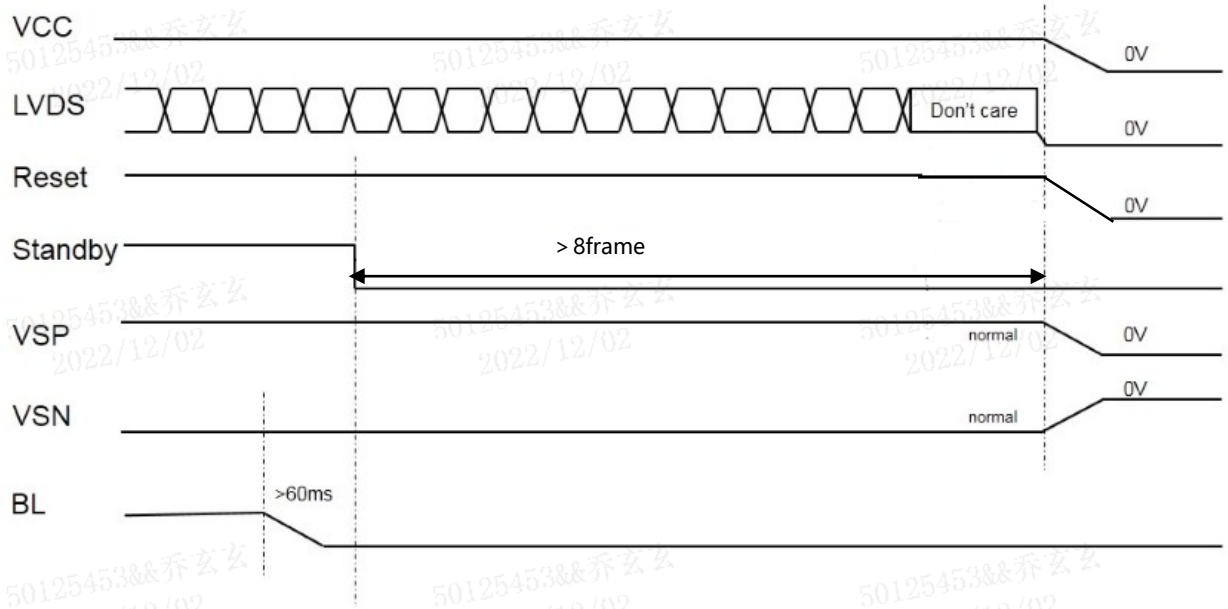
11.0 POWER ON/OFF SEQUENCE

11.1 POWER ON SEQUENCE



11.0 POWER ON/OFF SEQUENCE

11.2 POWER OFF SEQUENCE



Note: Reset 可与 VDD 下电同步