ZHIXUAN Display Technology Co.,LTD

Specification

ZXXS280-L02

(◆) Preliminary Specification
(　) Final Specification

MODEL : ZXXS280-L02
VERSION : 0.1
DATE : 2012-02-15
Doc.No : 1202-3228400L1

Signature Data	Approved by Data
_____ _____	_____ _____
_____ _____	_____ _____
_____ _____	_____ _____
Please return 1 copy for your information with your signature and comments	**Product Engineering Dept.**

The Information Described in this Specification is Preliminary and can be changed without prior notice

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

Contents

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

Revision History

Date	Rev.No	Page	Description
2012 / 02 / 15	0.1		Preliminary Specifications.

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	**Bar LCM Specification**

1. General Description

The ZXXS280-L02 is a Color Active Matrix Liquid Crystal Display with an integral Light Emitting Diode (LED) back l light s system. The mat r ix employs a-Si Thin Film Transistor as the active element .
It is a transmissive display type which is operating in the normally black mode. It has a 28 inch diagonally measured active display area with WUXGA resolution (400 vertical by 1920 horizontal pixel array).
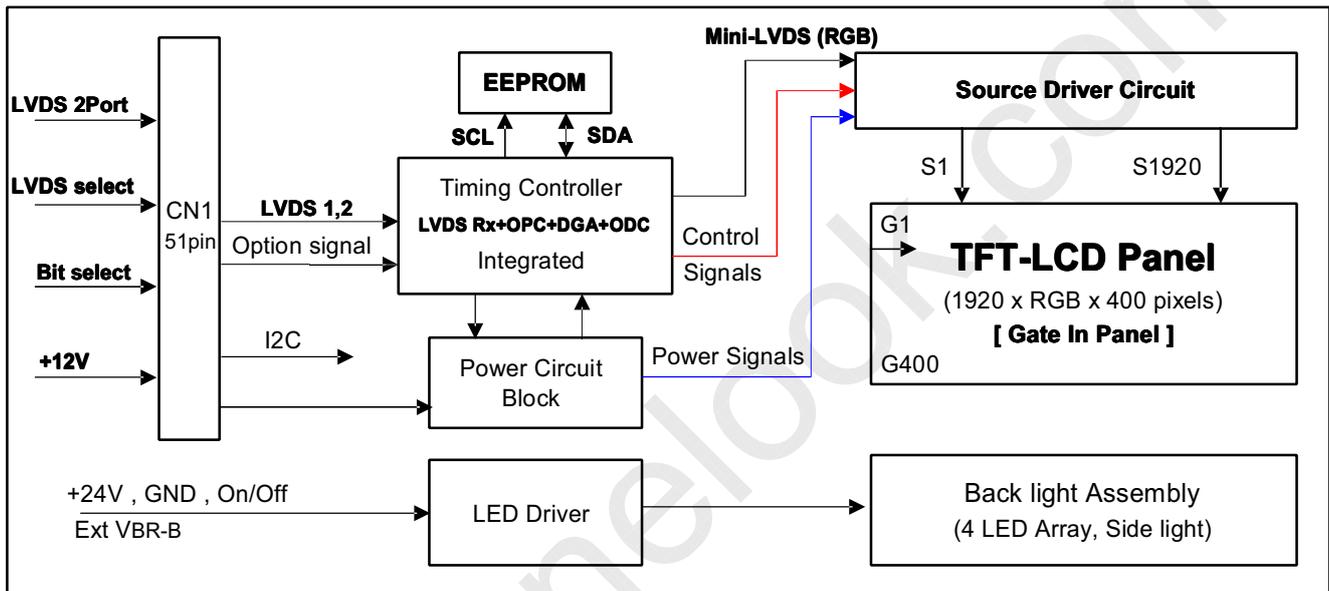Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arrayed in vertical stripes.
Gray scale or the luminance of the sub-pixel color is determined with a 10-bit gray scale signal for each dot.
Therefore, it can present a palette of more than 1.06Bilion colors.
It has been designed to apply the 10-bit 2-port LVDS interface.
It is intended to support LCD TV, PCTV where high brightness, super wide viewing angle, high color gamut, high color depth and fast response time are important.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! *www.panelook.com*

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

General Information

Active Display Size	698.4 (H) x 145.5 (V)
Display format	32inch, 3/8 type
Outline Dimension	741.4(H) x 188.5(V) x 30(D)
Pixel Pitch	0.36375 mm x 0.36375 mm
Pixel Format	1920 horiz. by 400 vert. pixels RGB stripe arrangement
Interface	LVDS 4Port
Color Depth	10Bit(D) , 1.06 Billion colors
Luminance, White	800 cd/m2 (Center 1-point) (Typ.)
Viewing Angle (CR>10)	Viewing Angle Free (R/L 178 (Typ.), U/D 178 (Typ))
Power Consumption	Total 82W (Typ.) (Logic=7.32 W, Inverter=74 W)
Weight	3.4Kg (Typ)
Display Operating Mode	Transmissive mode, Normally black
Surface Treatment	Hard coating (3H), Anti-glare treatment of the front polarizer (Haze 10%)

2. Absolute Maximum Ratings

The following items are maximum values which, if exceeded, may cause faulty operation or damage to the LCD module.

Table 1. Absolute maximum ratings

Parameter		Symbol	Value		Unit	Remarks
			Min	Max		
Power Input Voltage	LCD Circuit	V_{LCD}	-0.3	+14.0	V_{DC}	1
	Driver	V_{BL}	-0.3	+27.0	V_{DC}	
Driver Control Voltage	ON / OFF	V_{OFF} / V_{ON}	-0.3	+5.5	V_{DC}	
	Brightness	$EXTV_{BR-B}$	0.0	+5.5	V_{DC}	
T-Con Option Selection Voltage		V_{LOGIC}	-0.3	+4.0	V_{DC}	
Operating Temperature		T_{OP}	0	+50	°C	2 , 3
Storage Temperature		T_{ST}	-20	+60	°C	
Panel Front Temperature		T_{SUR}	-	+68	°C	4
Operating Ambient Humidity		H_{OP}	10	90	%RH	2 , 3
Storage Humidity		H_{ST}	10	90	%RH	

- NOTE
1. Ambient temperature condition (Ta = 25 ± 2 °C)
2. Temperature and relative humidity range are shown in the figure below.
   Wet bulb temperature should be Max 39 ° C, and no condensation of water.
3. Gravity mura can be guaranteed below 40 ° C condition.
4. The maximum operating temperatures is based on the test condition that the surface temperature of display area is less than or equal to 68 ° C with LCD module alone in a temperature controlled chamber.
   Thermal management should be considered in final product design to prevent the surface temperature of

ZHIXUAN Display Technology Co.,LTD

display area from being over 68℃. The range of operating temperature may degraded in case of improper thermal management in final product design.
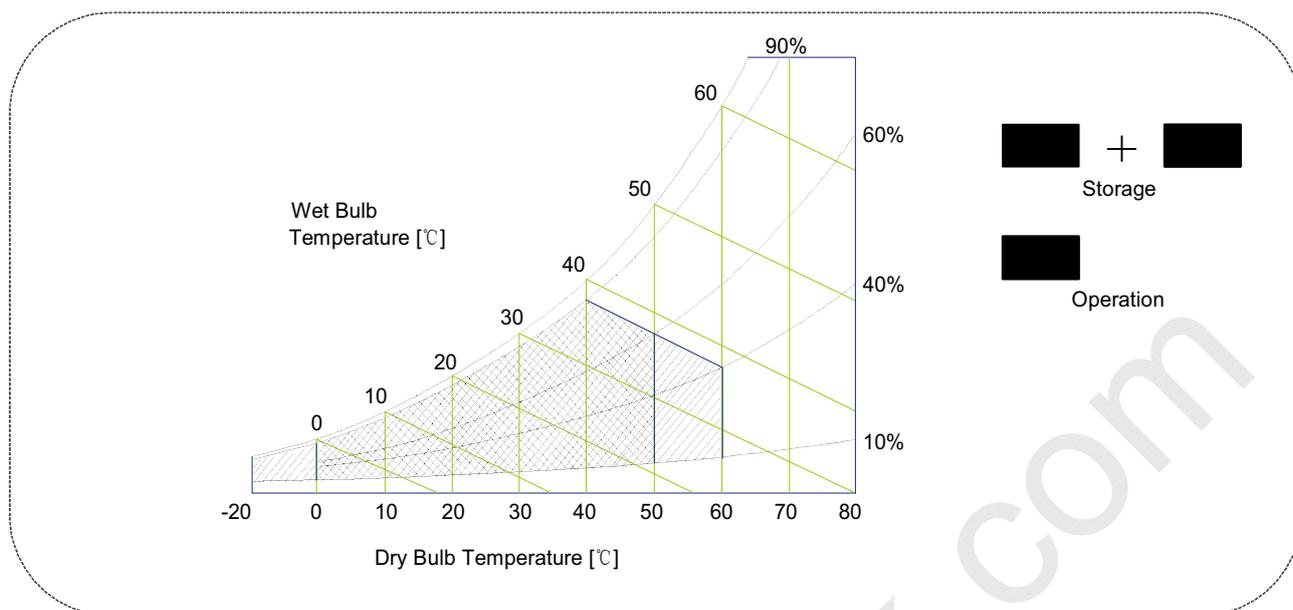
ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

3. Electrical Specifications

3.1. Electrical Characteristics

It requires two power inputs. One is employed to power for the LCD circuit. The other Is used for the LED backlight and LED Driver circuit.
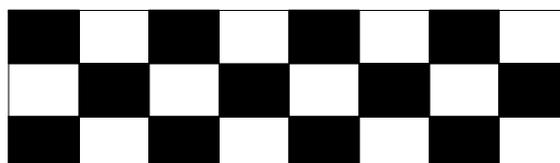
Table 2.   Electrical characteristics

Parameter	Symbol	Value			Unit	Remarks
		Min	Typ	Max		
Circuit :						
Power Input Voltage	V_{LCD}	10.8	12.0	13.2	VDC	
Power Input Current	I_{LCD}	-	610	790	mA	1
		-	800	1040	mA	2
Power Consumption	P_{LCD}		7.32	9.49	Watt	1
Rush current	I_{RUSH}	-	-	5.0	A	3

Note :

1. The specified current and power consumption are under the VLCD=12.0V, Ta=25 ± 2 ° C, fV=120Hz
   condition whereas mosaic pattern(8 x 3) is displayed and fV is the frame frequency.
2. The current is specified at the maximum current pattern.
3. The duration of rush current is about 2ms and rising time of power input is 0.5ms (min.).

White : 1023 Gray
Black : 0Gray

Mosaic Pattern (8 x 3)

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

Table 3. Electrical characteristics

Parameter			Symbol	Values			Unit	Remarks
				Min	Typ	Max		
LED Driver								
Power Supply Input Voltage			V_{BL}	22.8	24.0	25.2	Vdc	1
Power Supply Input Current			IBL_A	-	3.1	3.3	A	Ext VBR-B = 100%
Power Supply Input Current (In-Rush)			Irush	-	-	5.3	A	V_{BL} = 22.8V ExtV$_{BR\_B}$ = 100% 4
Power Consumption			P_{BL}	-	74	79	W	V_{BR-B} = 100%
	On/Off	On	Von	2.5	-	5.0	Vdc	
		Off	Voff	-0.3	0.0	0.8	Vdc	
	Brightness Adjust		ExtV$_{BR-B}$	10	-	100	%	On Duty
	PWM Frequency for NTSC & PAL	PAL			100		Hz	3
		NTSC			120		Hz	3
	Pulse Duty Level (PWM)	High Level		2.5	-	5.0		High : on duty Low : off duty
		Low Level		0.0	-	0.8		
LED :								
Life Time				30,000	50,000		Hrs	2

Notes :

1. Electrical characteristics are determined after the unit has been 'ON' and stable for approximately 60 minutes at 25±2°C. The specified current and power consumption are under the typical supply Input voltage 24Vand VBR (ExtVBR-B : 100%), it is total power consumption.
2. The life time(MTTF) is determined as the time which luminance of the LED is 50% compared to that of initial value at the typical LED current (ExtVBR-B :100%) on condition of continuous operating in LCM state at 25±2°C.
3. LGD recommend that the PWM freq. is synchronized with One time harmonic of Vsync signal of system. Though PWM frequency is over 120Hz (max 252Hz), function of LED Driver is not affected.
4. The duration of rush current is about 10ms.
5. Even though inrush current is over the specified value, there is no problem if I2T spec of fuse is satisfied.

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

3.2. Interface connections

This LCD module employs two kinds of interface connection, 51-pin connector connector is used for the module electronics and 14-pin connector is used for the integral backlight system.

3.2.1   LCD Module

- LCD Connector : FI-R51S-HF(manufactured by JAE) or KN25-51P-0.5SH(manufactured by Hirose)
 (CN1)   Refer to below and next Page table
- Mating Connector : FI-R51HL(JAE) or compatible

Table 4-1. Module connector(CN1) pin configuration

No.	Symbol	Description	No.	Symbol	Description
1	NC	No Connection	27	Bit Select	'H' or NC= 10bit(D) , 'L' = 8bit
2	NC	No Connection	28	R2AN	SECOND LVDS Receiver Signal (A−)
3	NC	No Connection	29	R2AP	SECOND LVDS Receiver Signal (A+)
4	NC	No Connection (Reserved for LGD)	30	R2BN	SECOND LVDS Receiver Signal (B−)
5	NC	No Connection (Reserved for LGD)	31	R2BP	SECOND LVDS Receiver Signal (B+)
6	NC	No Connection (Reserved for LGD)	32	R2CN	SECOND LVDS Receiver Signal (C−)
7	LVDS Select	'H' = JEIDA, 'L' or NC = VESA	33	R2CP	SECOND LVDS Receiver Signal (C+)
8	VBR EXT	External VBR (From System)	34	GND	Ground
9	OPC OUT	OPC output (From LCM)	35	R2CLKN	SECOND LVDS Receiver Clock Signal(−)
10	OPC Enable	'H' = Enable , 'L' or NC = Disable	36	R2CLKP	SECOND LVDS Receiver Clock Signal(+)
11	GND	Ground	37	GND	Ground
12	R1AN	FIRST LVDS Receiver Signal (A-)	38	R2DN	SECOND LVDS Receiver Signal (D−)
13	R1AP	FIRST LVDS Receiver Signal (A+)	39	R2DP	SECOND LVDS Receiver Signal (D+)
14	R1BN	FIRST LVDS Receiver Signal (B-)	40	R2EN	SECOND LVDS Receiver Signal (E−)
15	R1BP	FIRST LVDS Receiver Signal (B+)	41	R2EP	SECOND LVDS Receiver Signal (E+)
16	R1CN	FIRST LVDS Receiver Signal (C-)	42	NC	No Connection
17	R1CP	FIRST LVDS Receiver Signal (C+)	43	NC	No Connection
18	GND	Ground	44	GND	Ground
19	R1CLKN	FIRST LVDS Receiver Clock Signal(-)	45	GND	Ground
20	R1CLKP	FIRST LVDS Receiver Clock Signal(+)	46	GND	Ground
21	GND	Ground	47	NC	No connection
22	R1DN	FIRST LVDS Receiver Signal (D-)	48	VLCD	Power Supply +12.0V
23	R1DP	FIRST LVDS Receiver Signal (D+)	49	VLCD	Power Supply +12.0V
24	R1EN	FIRST LVDS Receiver Signal (E-)	50	VLCD	Power Supply +12.0V
25	R1EP	FIRST LVDS Receiver Signal (E+)	51	VLCD	Power Supply +12.0V
26	NC	No Connection	–	–	–

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

Notes :

1. All GND (ground) pins should be connected together to the LCD module's metal frame.

2. All VLCD (power input) pins should be connected together.

3. All Input levels of LVDS signals are based on the EIA 644 Standard.

4. Specific pins (pin No. #2~#6) are used for internal data process of the LCD module.
   These pins should be no connection.

5. Specific pins (pin No. # 8~#10) are used for OPC function of the LCD module.
   If not used, these pins are no connection

6. LVDS pin (pin No. #24,25,40,41) are used for 10Bit(D) of the LCD module.
   If used for 8Bit(R), these pins are no connection.

7. Specific pin No. #44 is used for "No signal detection" of system signal interface.
   It should be GND for NSB (No Signal Black) during the system interface signal is not.
   If this pin is "H", LCD Module displays AGP (Auto Generation Pattern).

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

3.2.2 Backlight

Master

- LED Driver Connector : 20022WR-14B1(Yeonho) or Equivalent
- Mating Connector : 20022HS-14 or Equivalent

Table 5. LED DRIVER CONNECTOR PIN CONFIGURATION

No.	Symbol	Description		
1	VBL	Power Supply +24.0V	VBL	
2	VBL	Power Supply +24.0V	VBL	
3	VBL	Power Supply +24.0V	VBL	
4	VBL	Power Supply +24.0V	VBL	
5	VBL	Power Supply +24.0V	VBL	
6	GND	Backlight Ground	GND	
7	GND	Backlight Ground	GND	
8	GND	Backlight Ground	GND	1
9	GND	Backlight Ground	GND	
10	GND	Backlight Ground	GND	
11	NC	No connection	OPEN or GND	
12	Von / off	Backlight ON / OFF control	Von / off	
13	EXT VBR-B	External PWM	EXT VBR-B	2
14	GND	Backlight Ground	GND	3

Notes :

1. GND should be connected to the LCD module's metal frame.

2. High : on duty / Low : off duty, Pin#13 can be opened. (if Pin #13 is open , EXTVBR-B is 100%)

3. #14 of Input CNT Must be Connected to Backlight Ground.

4. Each impedance of pin #12 and 13 is over 50 [KΩ] and over 50 [KΩ].

■ **Rear view of LCM**
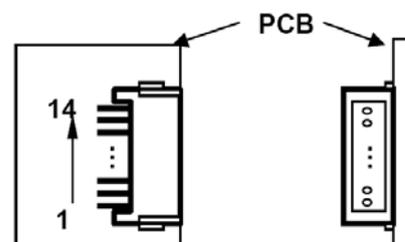
< Master >

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

3.3 Signal Timing Specifications

Table 6 shows the signal timing required at the input of the LVDS transmitter. All of the interface signal timings should be satisfied with the following specification for normal operation.

Table 6-1. TIMING TABLE for NTSC (DE Only Mode)

ITEM		Symbol	Min	Typ	Max	Unit	Note
Horizontal	Display Period	tHV	-	960	-	tclk	
	Blank	tHB	100	140	240	tclk	
	Total	tHP	1060	1100	1200	tclk	2200 / 2
Vertical	Display Period	tVV	-	1080	-	Lines	
	Blank	tVB	11	45	69	Lines	
	Total	tVP	1091	1125	1149	Lines	

ITEM		Symbol	Min	Typ	Max	Unit	Note
Frequency	DCLK	fCLK	70	74.25	77	MHz	148.5 / 2
	Horizontal	fH	65	67.5	70	KHz	
	Vertical	fV	57	60	63	Hz	

Table 6-2. TIMING TABLE for DVE / PAL (DE Only Mode)

ITEM		Symbol	Min	Typ	Max	Unit	Note
Horizontal	Display Period	tHV	-	960	-	tclk	
	Blank	tHB	100	140	240	tclk	
	Total	tHP	1060	1100	1200	tclk	2200 / 2
Vertical	Display Period	tVV	-	1080	-	Lines	
	Blank	tVB	228	270	300	Lines	1
	Total	tVP	1308	1350	1380	Lines	

ITEM		Symbol	Min	Typ	Max	Unit	Note
Frequency	DCLK	fCLK	70	74.25	77	MHz	148.5 / 2
	Horizontal	fH	65	67.5	70	KHz	
	Vertical	fV	47	50	53	Hz	

Note :

1. The Input of HSYNC & VSYNC signal does not have an effect on normal operation(DE Only Mode).
   If you use spread spectrum for EMI, add some additional clock to minimum value for clock margin.
2. The performance of the electro-optical characteristics may be influenced by variance of the vertical
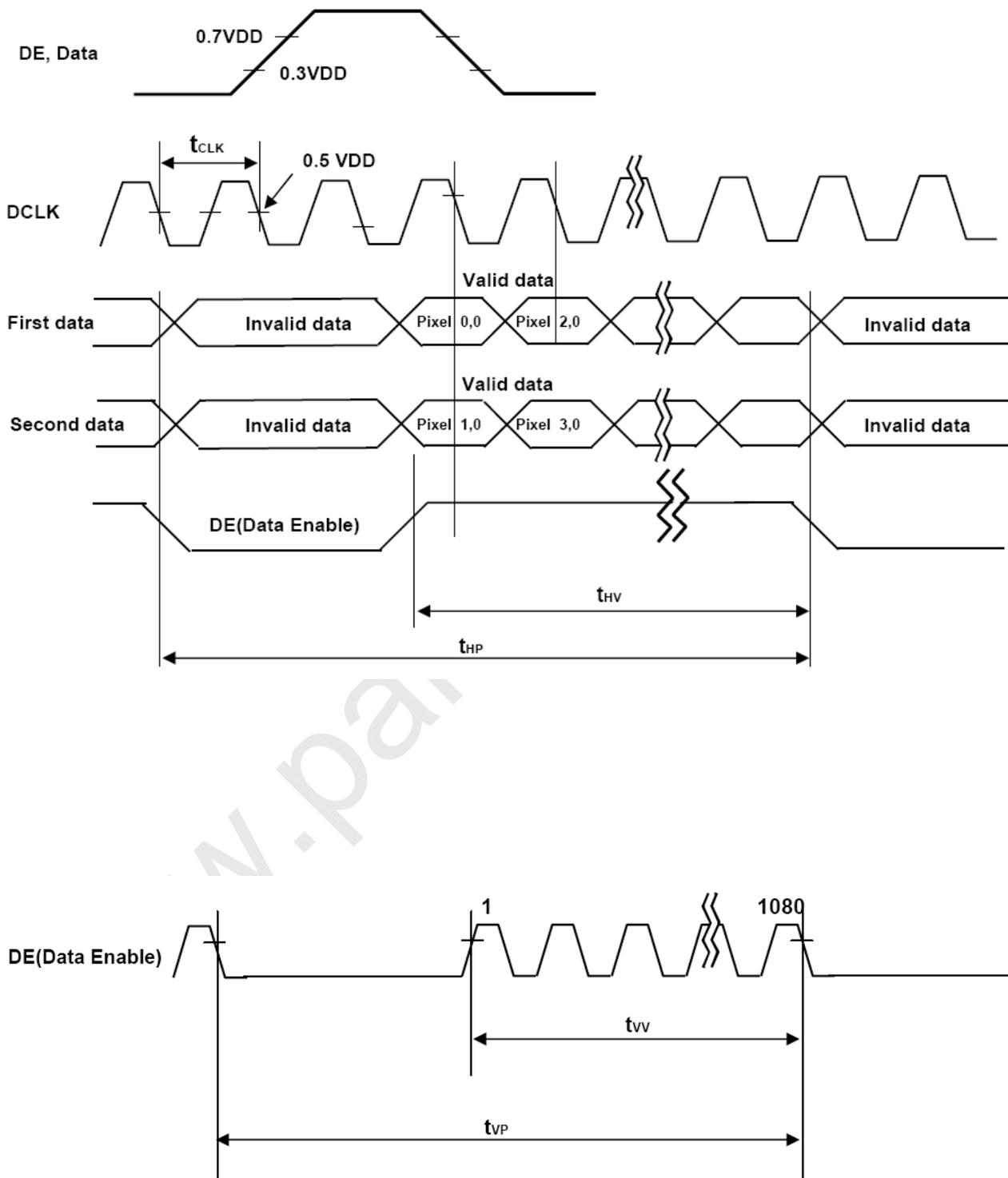   refresh rate and the horizontal frequency.

ZHIXUAN Display Technology Co.,LTD

| ZXXS280-L02 | Bar LCM Specification |

3.4. LVDS Signal Specification

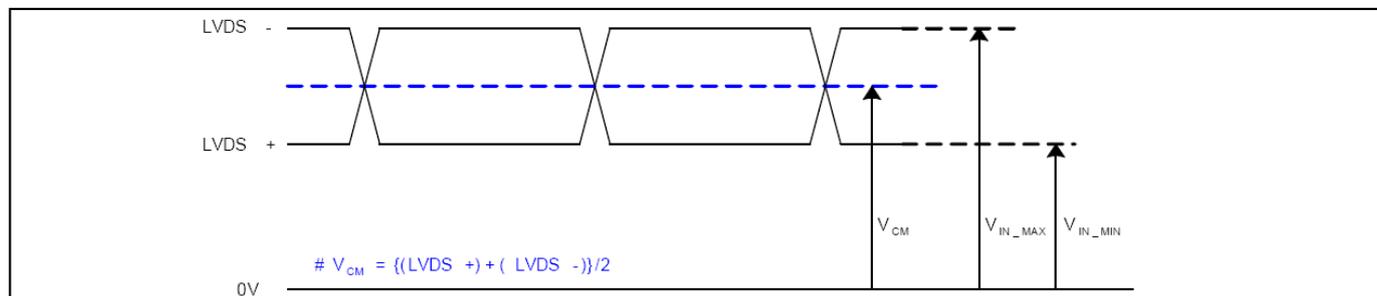### 3.4.1 LVDS Input Signal Timing Diagram

ZHIXUAN Display Technology Co.,LTD
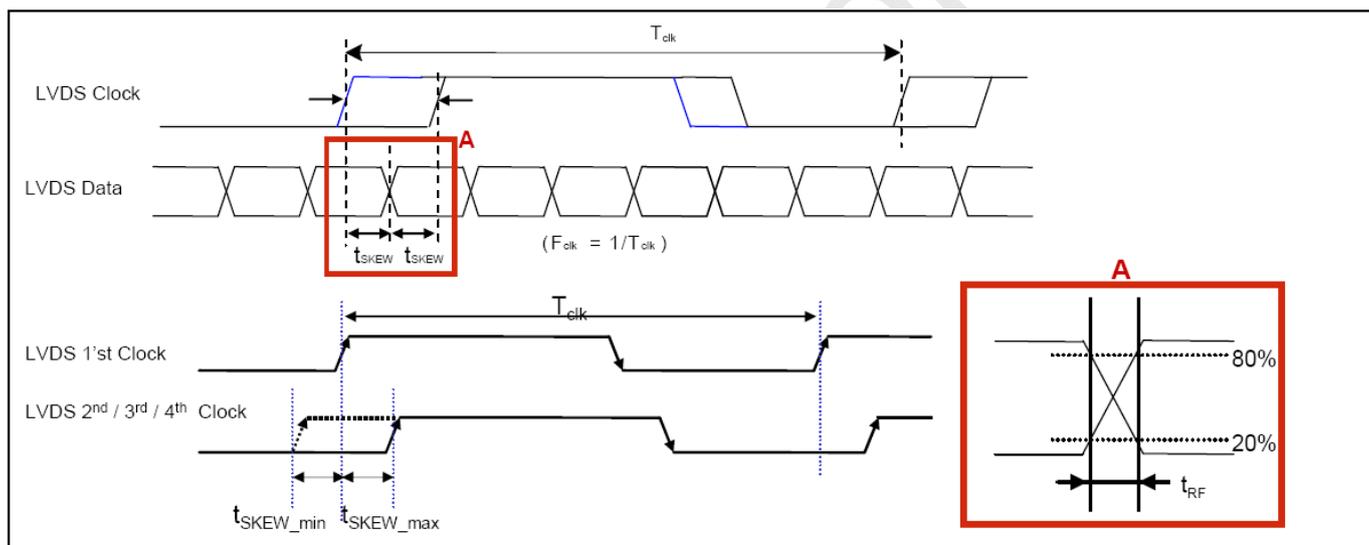
ZXXS280-L02	Bar LCM Specification

3.4.2 LVDS Input Signal Characteristics

1) DC Specification

$$\# \ V_{CM} = \{(LVDS \ +) + (\ LVDS \ -)\}/2$$

Description	Symbol	Min	Max	Unit	Note
LVDS Common mode Voltage	VCM	1.0	1.5	V	-
LVDS Input Voltage Range	VIN	0.7	1.8	V	-
Change in common mode Voltage	△VCM	-	250	mV	-

2) AC Specification

| Description		Symbol	Min	Max	Unit	Note
LVDS Differential Voltage	High Threshold	VTH	100	300	mV	3
	Low Threshold	VTL	-300	-100	mV	
LVDS Clock to Data Skew Margin		tSKEW	-	/(0.25*Tclk)/7/	ps	-
LVDS Clock/DATA Rising/Falling time		tRF	260	(0.3*Tclk)/7	ps	2
Effective time of LVDS		teff	±360	-	ps	-
LVDS Clock to Clock Skew Margin (Even to Odd)		tSKEW_EO	-	1/7*Tclk	Tclk	-

Note :

1. All Input levels of LVDS signals are based on the EIA 644 Standard.

2. If tRF isn't enough, teff should be meet the range.

3. LVDS Differential Voltage is defined within teff

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification
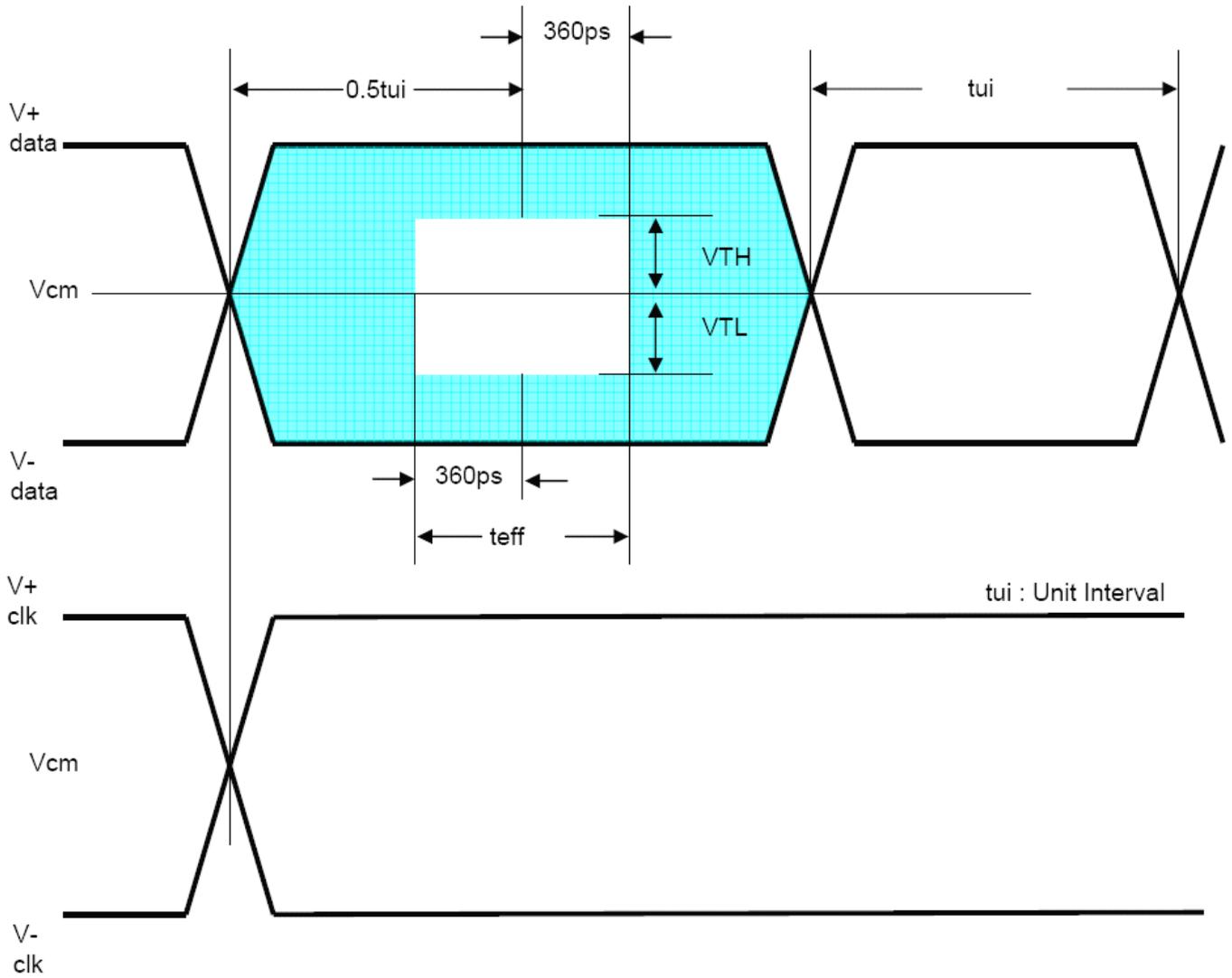
ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

3.5 Color Data Reference

The brightness of each primary color (red,green,blue) is based on the 10-bit gray scale data input for the color.
The higher binary input, the brighter the color. Table 7 provides a reference for color versus data input.

Table 7.   Color Data Reference

Color		Input Color Data		
		RED MSB LSB R9 R8 R7 R6 R5 R4 R3 R2 R1 R0	GREEN MSB LSB G9 G8 G7 G6 G5 G4 G3 G2 G1 G0	BLUE MSB LSB B9 B8 B7 B6 B5 B4 B3 B2 B1 B0
Basic Color	Black	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
	Red (1023)	1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
	Green (1023)	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0
	Blue (1023)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1
	Cyan	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1
	Magenta	1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1
	Yellow	1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1	0 0 0 0 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 1 1	1 1 1 1 1 1 1 1 1 1
RED	RED (0000)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
	RED (0001)	0 0 0 0 0 0 0 0 0 1	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
	...	...	...	...
	RED (1022)	1 1 1 1 1 1 1 1 1 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
	RED (1023)	1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
GREEN	GREEN (0000)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
	GREEN (0001)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	0 0 0 0 0 0 0 0 0 0
	...	...	...	...
	GREEN (1022)	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 0	0 0 0 0 0 0 0 0 0 0
	GREEN (1023)	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0 0
BLUE	BLUE (0000)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
	BLUE (0001)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1
	...	...	...	...
	BLUE (1022)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 0
	BLUE (1023)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1

ZHIXUAN Display Technology Co.,LTD

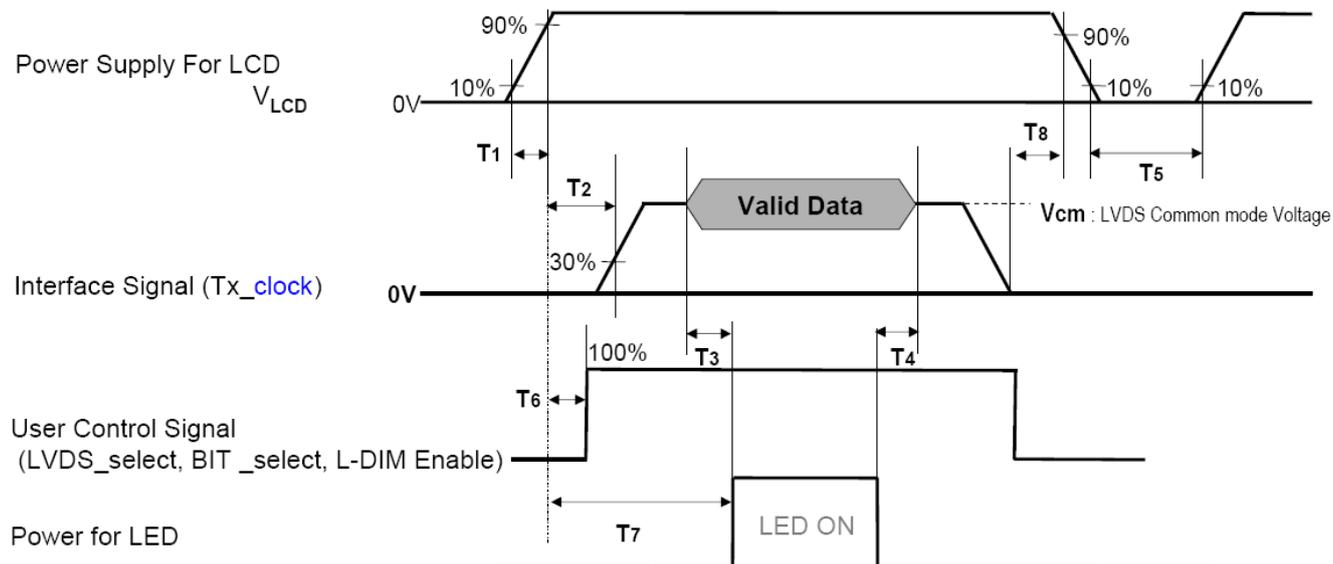| ZXXS280-L02	Bar LCM Specification

3.6.   Power Sequence

3.6.1.   LCD Driving circuit

Table 8.   POWER SEQUENCE

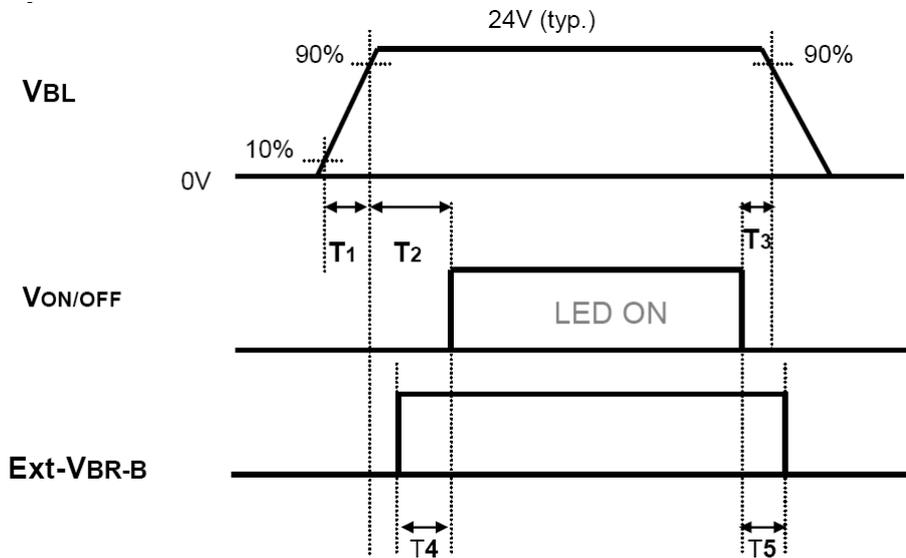| Parameter	Value			Unit	Remarks
	Min	Typ	Max		
T1	0.5	-	20	ms	
T2	0	-	-	ms	4
T3	200	-	-	ms	3
T4	200	-	-	ms	3
T5	1.0	-	-	s	5
T6	-	-	-	ms	4
T7	0.5	-	T2	s	
T8	100	-	-	ms	6

Note :

1. Please avoid floating state of interface signal at invalid period.
2. When the power supply for LCD (VLCD) is off, be sure to pull down the valid and invalid data to 0V.
3. The T3 / T4 is recommended value, the case when failed to meet a minimum specification,
   abnormal display would be shown. There is no reliability problem.
4. If the on time of signals (Interface signal and user control signals) precedes the on time of Power (VLCD),
   it will be happened abnormal display. When T6 is NC status, T6 doesn't need to be measured.
5. T5 should be measured after the Module has been fully discharged between power off and on
   period.
6. It is recommendation specification that T8 has to be 100ms as a minimum value.

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

3.6.2. Sequence for LED Driver

Power Supply For LED Driver
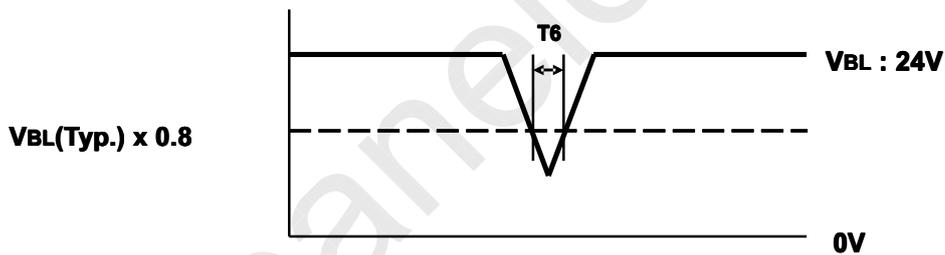

3.6.3. Dip condition for LED Driver

Table 9. Power Sequence for LED Driver

Parameter	Values			Units	Remarks
	Min	Typ	Max		
T1	20	-	-	ms	1
T2	500	-	-	ms	
T3	10	-	-	ms	
T4	0		-	ms	
T5	0	-	-	ms	
T6	-	-	10	ms	V_{BL}(Typ) x 0.8

Notes :

1. T1 describes rising time of 0V to 24V and this parameter does not applied at restarting time.
   Even though T1 is over the specified value, there is no problem if I2T spec of fuse is satisfied.

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

4. Optical specification

Optical characteristics are determined after the unit has been 'ON' and stable in a dark environment at 25±2°C. The values are specified at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and ⊖ equal to 0 °.
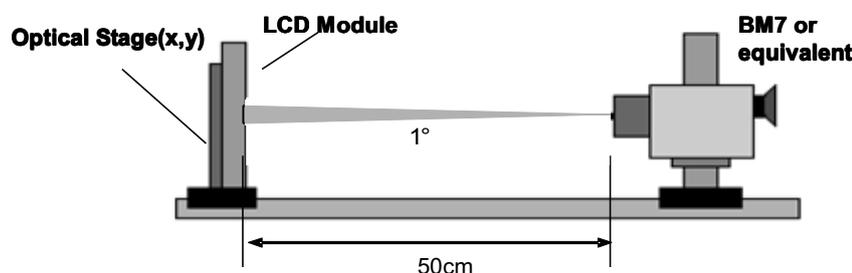FIG. 1 shows additional information concerning the measurement equipment and method.

FIG. 1 Optical Characteristic Measurement Equipment and Method

Table 10.   Optical characteristics

Ta=25±2°C,VLCD=12.0V,fV=60Hz,Dclk=74.25MHz,EXTVBR-B=100%

Parameter		Symbol		Value			Unit	Remarks
				Min	Typ	Max		
Contrast Ratio		CR		900	1300	-		1
Surface Luminance, white		L_{WH}		750	8000		cd/m²	2
Luminance Variation		δ_{WHITE}	5P	-	-	1.3		3
Response Time	Gray-to- Gray	G to G		-	5	8	ms	4 , 5
	MPRT	MPRT		-	8	12	ms	
	Uniformity	δ_{MPRT}		-	-	1		
	Uniformity	$\delta_{G\ TO\ G}$		-	-	1		
Color Coordinates [CIE1931]	RED	Rx		Typ -0.03	0.651	Typ +0.03		
		Ry			0.332			
	GREEN	Gx			0.308			
		Gy			0.597			
	BLUE	Bx			0.149			
		By			0.059			
	WHITE	Wx			0.279			
		Wy			0.292			
Color Temperature					10,000		K	
Color Gamut (CIE1931 NTSC)					72		%	
Viewing Angle (CR>10)								
	x axis, right(φ=0°)	θr		89	-	-	degree	6
	x axis, left (φ=180°)	θl		89	-	-		
	y axis, up (φ=90°)	θu		89	-	-		
	y axis, down (φ=270°)	θd		89	-	-		
Gray Scale				-	-	-		7

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

Notes : 1. Contrast Ratio(CR) is defined mathematically as :
Contrast Ratio = (Surface Luminance with all white pixels) / (Surface Luminance with all black pixels)
It is measured at center 1-point.

2. Surface luminance are determined after the unit has been 'ON' and 1 Hour after lighting the backlight in a dark environment at 25±2°C. Surface luminance is the luminance value at center 1-point across the LCD surface 50cm from the surface with all pixels displaying white.
For more information see the FIG. 2.

3. The variation in surface luminance , δ WHITE is defined as :
δ WHITE(5P) = Maximum(Lon1,Lon2, Lon3, Lon4, Lon5) / Minimum(Lon1,Lon2, Lon3, Lon4, Lon5)
Where Lon1 to Lon5 are the luminance with all pixels displaying white at 5 locations .
For more information, see the FIG. 2.

4. Response time is the time required for the display to transit from G(N) to G(M) (Rise Time, TrR) and from G(M) to G(N) (Decay Time, TrD). For additional information see the FIG. 3. (N<M)
※ G to G Spec stands for average value of all measured points. Photo Detector : RD-80S / Field : 2°

5. MPRT is defined as the 10% to 90% blur-edge width Bij (pixels) and scroll speed U (pixels/frame) at the moving picture.

6. Gray to Gray / MPRT Response time uniformity is Reference data. Appendix IV-1 / IV-2.

7. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for   the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD module surface.
For more information, see the FIG. 5.

8. Gray scale specification
Gamma Value is approximately 2.2. For more information, see the Table 11.

Table 11.   GRAY SCALE SPECIFICATION

Gray Level	Luminance [%] (Typ)
L0	0.077
L15	0.28
L31	1.05
L47	2.50
L63	4.69
L79	7.67
L95	11.47
L111	16.11
L127	21.64
L143	28.07
L159	35.43
L175	43.73
L191	52.99
L207	63.23
L223	74.47
L239	86.72
L255	100

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

Measuring point for surface luminance & luminance variation

A   : H / 4 mm
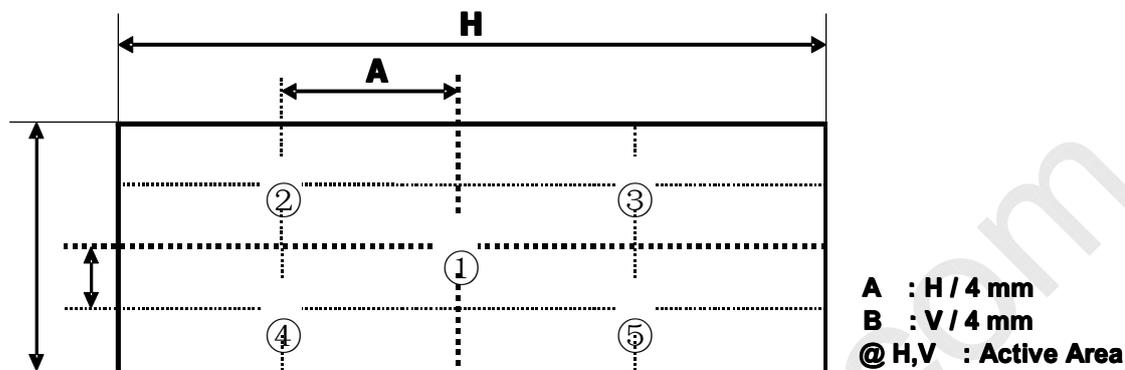B   : V / 4 mm
@ H,V   : Active Area

FIG.2   5 Points for Luminance Measure

Response time is defined as the following figure and shall be measured by switching the input signal for "Gray(N)" and "Gray(M)".
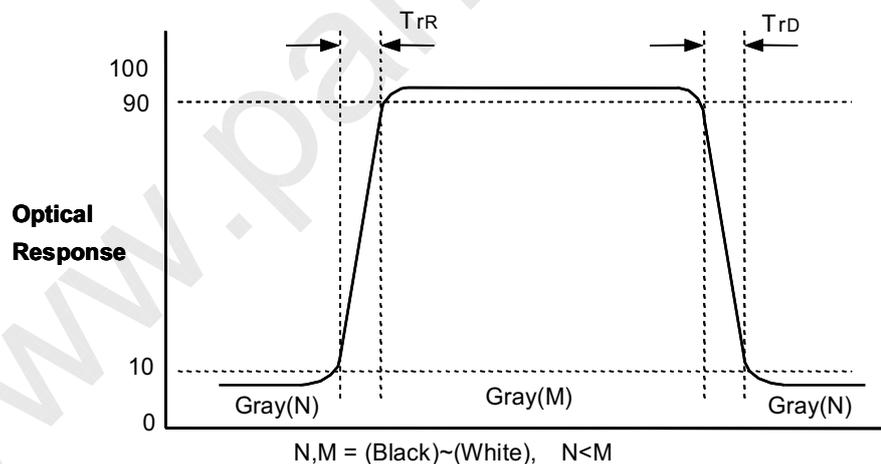

N,M = (Black)~(White),   N<M

FIG.3 Response Time

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

Dimension of viewing angle range
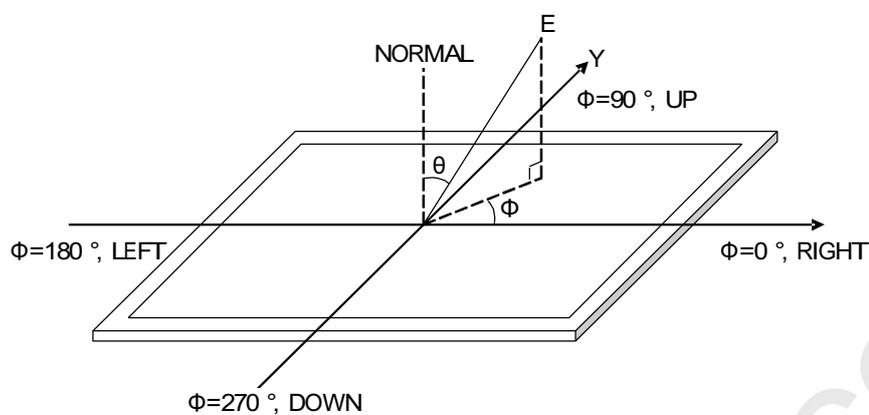
FIG. 5   Viewing Angle

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

5. Mechanical Characteristics

Table 12　provides general mechanical characteristics.

Table 12.　MECHANICAL CHARACTERISTICS

Item	Value	
Outline Dimension	Horizontal	741.4 mm
	Vertical	188.5 mm
	Depth	30.0 mm
Bezel Area	Horizontal	705.4 mm
	Vertical	152.5 mm
Active Display Area	Horizontal	698.4 mm
	Vertical	145.5 mm
Weight	3.4 Kg	

Notes :

Please refer to a mechanic drawing in terms of tolerance at the next page.

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

<FRONT VIEW>

188.5(OUT)
152.5(B/O)
145.5(A/A)

328

8

336

336

8

10.4

698.4(A/A)
705.4(B/O)
741.4(OUT)

UP

DOWN

1920*400 = 698.4mm*145.5mm

328

10.4

2-3-M4 TAP DP MAX=6.0MIN=4.0

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

<REAR VIEW>

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

6. Reliability

Table 13. Environment test conditions

No.	Test Item		Condition
1	High temperature storage test		Ta= 60°C 240h
2	Low temperature storage test		Ta= -20°C 240h
3	High temperature operation test		Ta= 50°C 50%RH 240h
4	Low temperature operation test		Ta= 0°C 240h
5	Vibration test		Wave form : random Vibration level : 1.0Grms Bandwidth : 10-300Hz Duration : X,Y,Z 30 min Each direction per 10 min
6	Shock test (non-operation)		Shock level :100Gms Waveform : half sine wave, 2ms Direction : ±X, ±Y, ±Z One time each direction
7	Humidity condition Operation		Ta= 40°C 90%RH
8	Altitude	operating	0 - 15,000 ft
		storage / shipment	0 - 40,000 ft

Notes :
  1. Before and after Reliability test, LCM should be operated with normal function.

7. International standard

7.1.   Safety

TBD

7.2.

EMC

TBD

8.   Packing

TBD

9.   Marking & Others

TBD

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

10. Precautions

Please pay attention to the followings when you use this TFT LCD module.

10-1. Mounting Precautions

(1)　You must mount a module using specified mounting holes (Details refer to the drawings).

(2)　You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the Module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.

(3)　Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.

(4)　You should adopt radiation structure to satisfy the temperature specification.

(5)　Acetic acid type and chlorine type materials for the cover case are not desirable because the former　generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.

(6)　Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
Do not touch the surface of polarizer for bare hand or greasy cloth.
(Some cosmetics are detrimental to the polarizer.)

(7)　When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.

(8)　Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.

(9)　Do not open the case because inside circuits do not have sufficient strength.

10-2. Operating precautions

(1)　The spike noise causes the mis-operation of circuits. It should be lower than following voltage : V=±200mV(Over and under shoot voltage)

(2)　Response time depends on the temperature.(In lower temperature, it becomes longer.)

(3)　Brightness depends on the temperature. (In lower temperature, it becomes lower.)
And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer.

(4)　Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.

(5)　When fixed patterns are displayed for a long time, remnant image is likely to occur.

(6)　Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.

(7)　Please do not give any mechanical and/or acoustical impact to LCM. Otherwise, LCM can not be　operated its full characteristics perfectly.

(8)　A screw which is fastened up the steels should be a machine screw (if not, it causes metal foreign material and deal LCM a fatal blow)

(9)　Please do not set　LCD on its edge.

(10)　The conductive material and signal cables are kept away from LED driver inductor to prevent abnormal display, sound noise and temperature rising.

ZHIXUAN Display Technology Co.,LTD

| ZXXS280-L02 | Bar LCM Specification |

10-3. Electrostatic discharge control

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge.
Make certain that treatment persons are connected to ground through wrist band etc.
And don't touch interface pin directly.

10-4. Precautions for strong light exposure

Strong light exposure causes degradation of polarizer and color filter.

10-5. Storage

When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep
the temperature between 5°C and 35°C at normal humidity.
(2) The polarizer surface should not come in contact with any other object.
It is recommended that they be stored in the container in which they were shipped.

10-6. Handling precautions for protection film

(1)   The protection film is attached to the bezel with a small masking tape.
When the protection film is peeled off, static electricity is generated between
the film and polarizer. This should be peeled off slowly and carefully by people who are
electrically grounded and with well ion-blown equipment or in such a condition, etc.
(2)   When the module with protection film attached is stored for a long time,
sometimes there remains a very small amount of glue still on the bezel
after the protection film is peeled off.
(3)   You can remove the glue easily. When the glue remains on the bezel surface or
its vestige is recognized, please wipe them off with absorbent cotton waste or
other soft material like chamois soaked with normal-hexane.

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

APPENDIX-1

■ Required signal assignment for Flat Link (Thine : THC63LVD103) Transmitter(Pin7="L")

Note:
1. The LCD module uses a 100 Ohm[Ω] resistor between positive and negative lines of each receiver input.
2. Refer to LVDS Transmitter Data Sheet for detail descriptions. (THC63LVD103 or Compatible)
3. '9' means MSB and '0' means LSB at R,G,B pixel data.
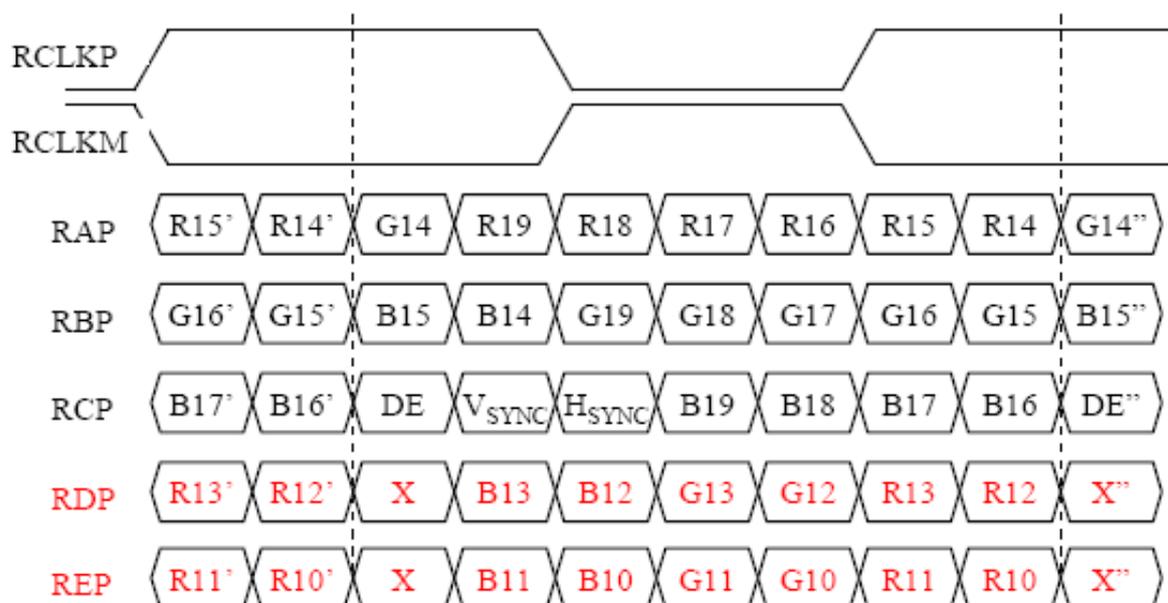
ZHIXUAN Display Technology Co.,LTD
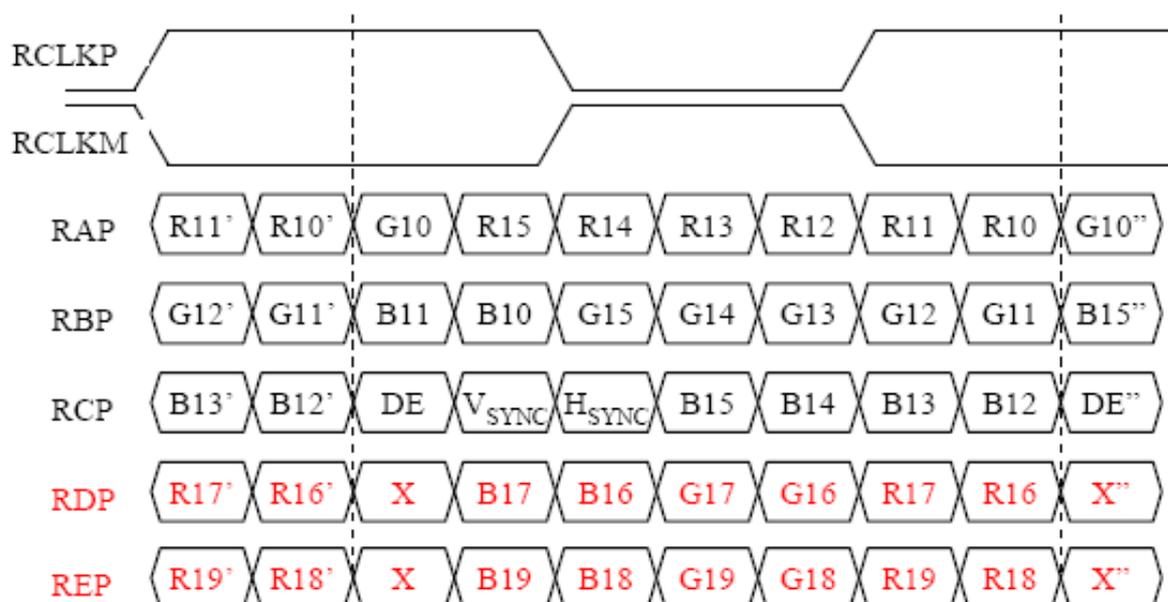
ZXXS280-L02	Bar LCM Specification

APPENDIX-2

■ Required signal assignment for Flat Link (Thine : THC63LVD103) Transmitter(Pin7="H")
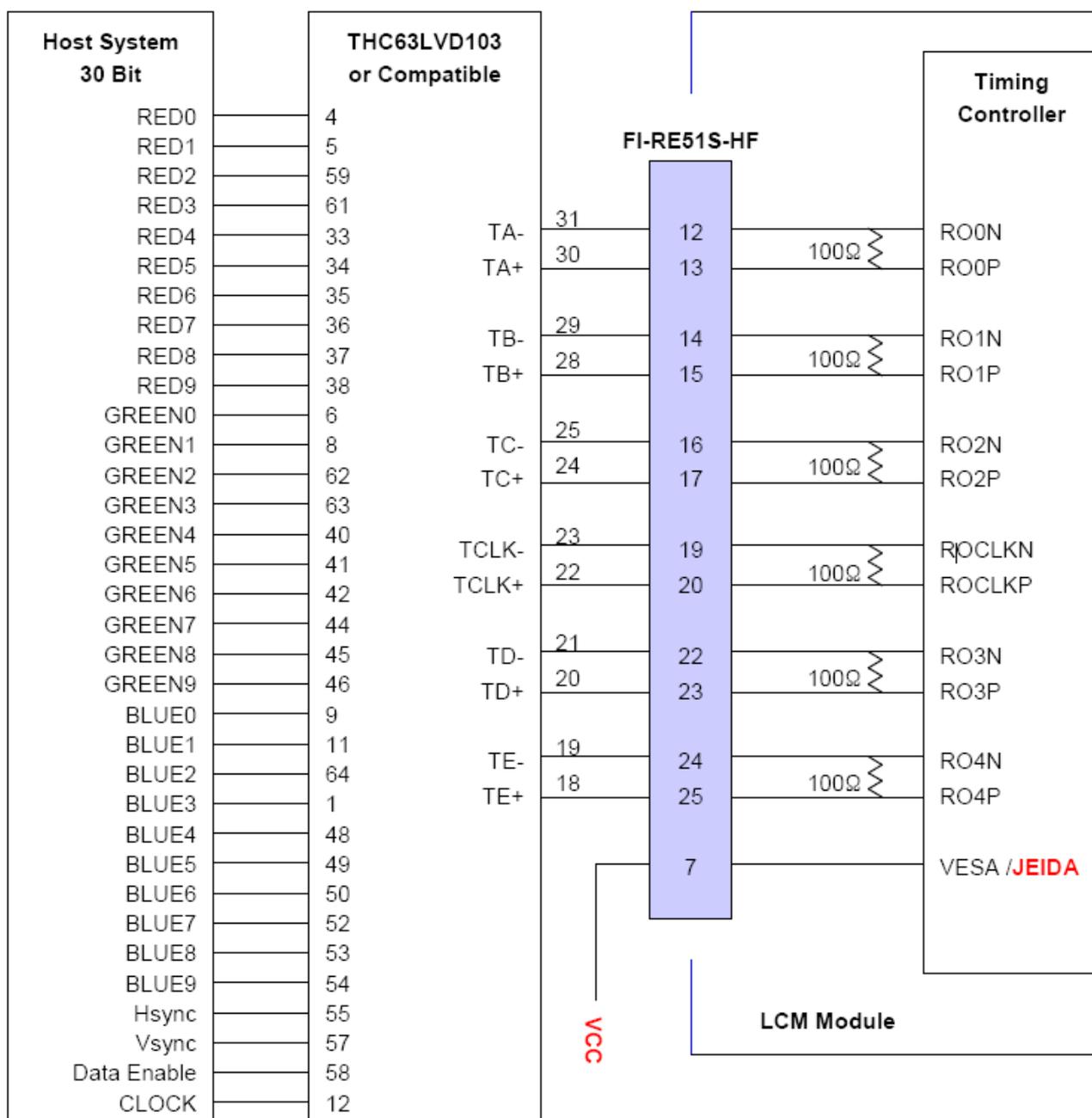
Note:

1. The LCD module uses a 100 Ohm[Ω] resistor between positive and negative lines of each receiver input.

2. Refer to LVDS Transmitter Data Sheet for detail descriptions. (THC63LVD103 or Compatible)

3. '9' means MSB and '0' means LSB at R,G,B pixel data.

ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

APPENDIX-3

LVDS Data-Mapping info. (10 bit)

1) LVDS Select : "H" Data-Mapping (**JEIDA format**)

2) LVDS Select : "L" Data-Mapping (**VESA format**)
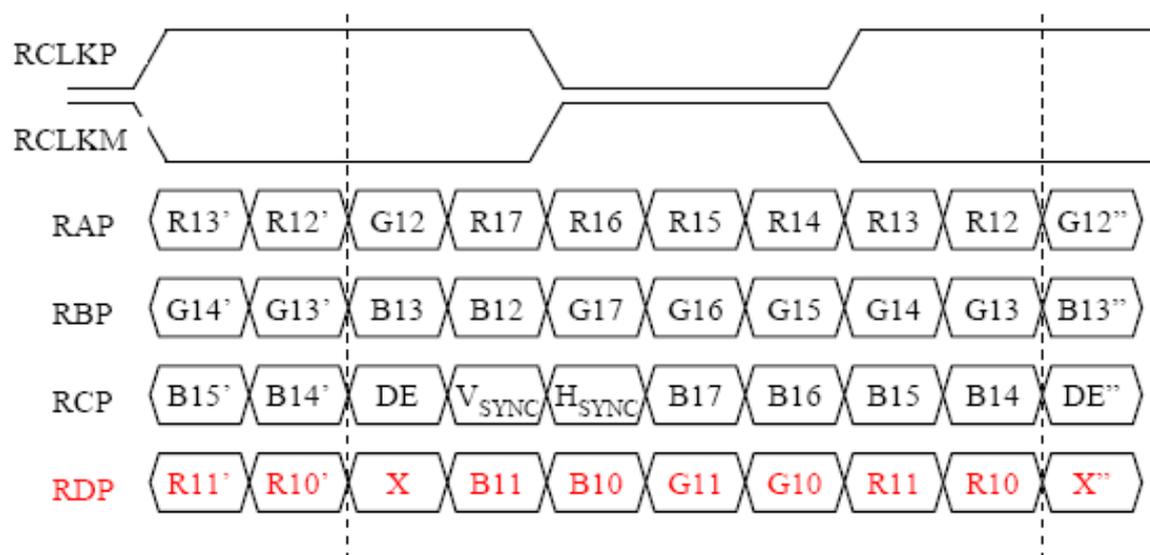
ZHIXUAN Display Technology Co.,LTD

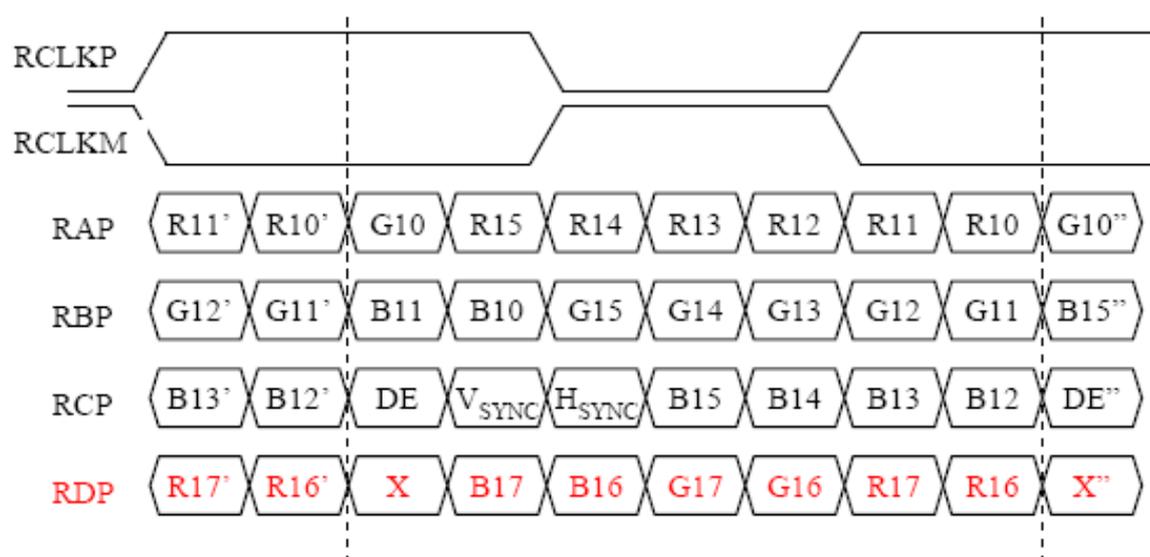| ZXXS280-L02	Bar LCM Specification

APPENDIX-4

LVDS Data-Mapping info. (8 bit)

1) LVDS Select : "H" Data-Mapping (JEIDA format)

2) LVDS Select : "L" Data-Mapping (VESA format)
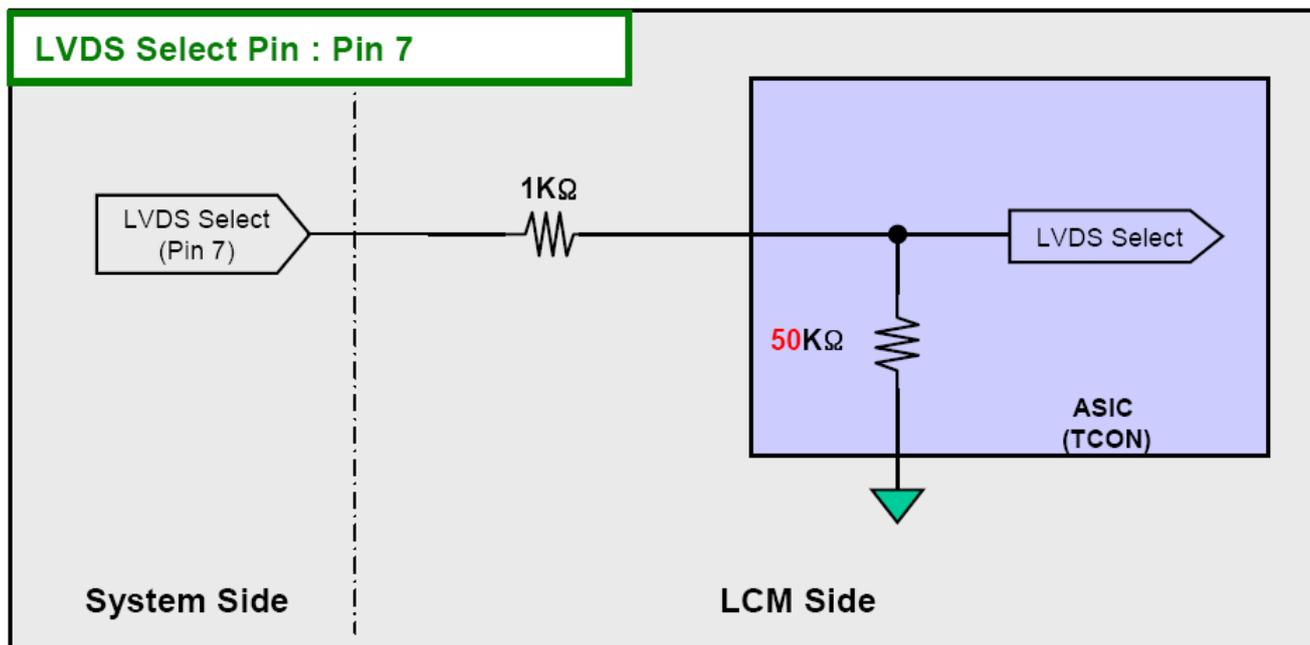
ZHIXUAN Display Technology Co.,LTD

ZXXS280-L02	Bar LCM Specification

APPENDIX-5

■ Option Pin Circuit Block Diagram

1) Circuit Block Diagram of **LVDS Format** Selection pin

LVDS Select Pin : Pin 7

LVDS Select (Pin 7) — 1KΩ — 50KΩ — LVDS Select — ASIC (TCON)

System Side   LCM Side

2) Circuit Block Diagram of **OPC Enable** Selection pin

OPC Enable Pin : Pin 10

OPC_Enable (Pin 10) — R1 — 1KΩ — VCC OPEN — VCC 50KΩ — OPC_Enable — ASIC (TCON)

System Side
R1 ≤ 1KΩ   LCM Side