倍顯(香港)有限公司
Facelcd(HongKong) Limited

PRODUCT SPECIFICATION

Doc. Number:

☐ Tentative Specification

☐ Preliminary Specification

■Approval Specification

MODEL NO.: FB150NXV301-A

Customer:	
APPROVED BY	**SIGNATURE**
Name / Title	
Note :	

CONTENTS

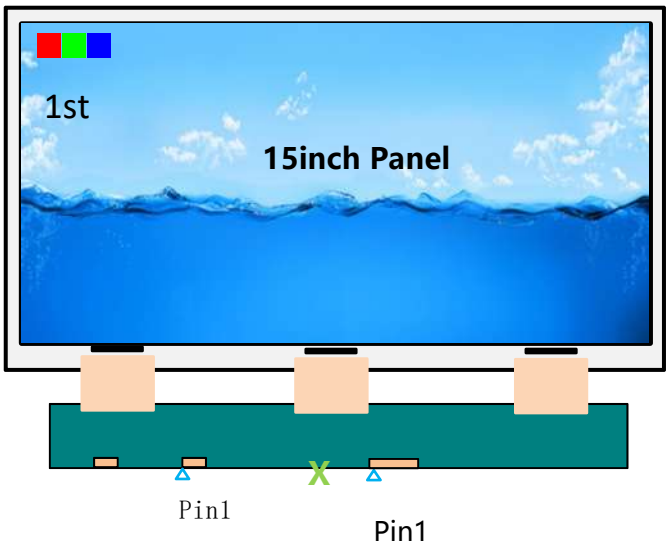
1.0 General description

1.1 Introduction

The specification is applied to 15.0 inch model (FB150NXV301-A)TFT Liquid Crystal Display. The matrix uses a-Si Thin Film Transistor as a switching device. This TFT LCD has a 15.0 inch diagonally measured active display area with HD resolution (1024 horizontal by 768 vertical pixels array). This product is with data driver ICs and 20-pins connectors with LVDS interface.

1.2 Features

- 1 Port LVDS interface
- 16.7M (6bit+FRC) color depth, color gamut 70%
- Green product (RoHS & Halogen free product)
- DE (Data Enable) only mode
- On board LED driving circuit
- Low driving voltage and low power consumption
- Adjust backlight brightness with DC mode
- ROHS Compliant



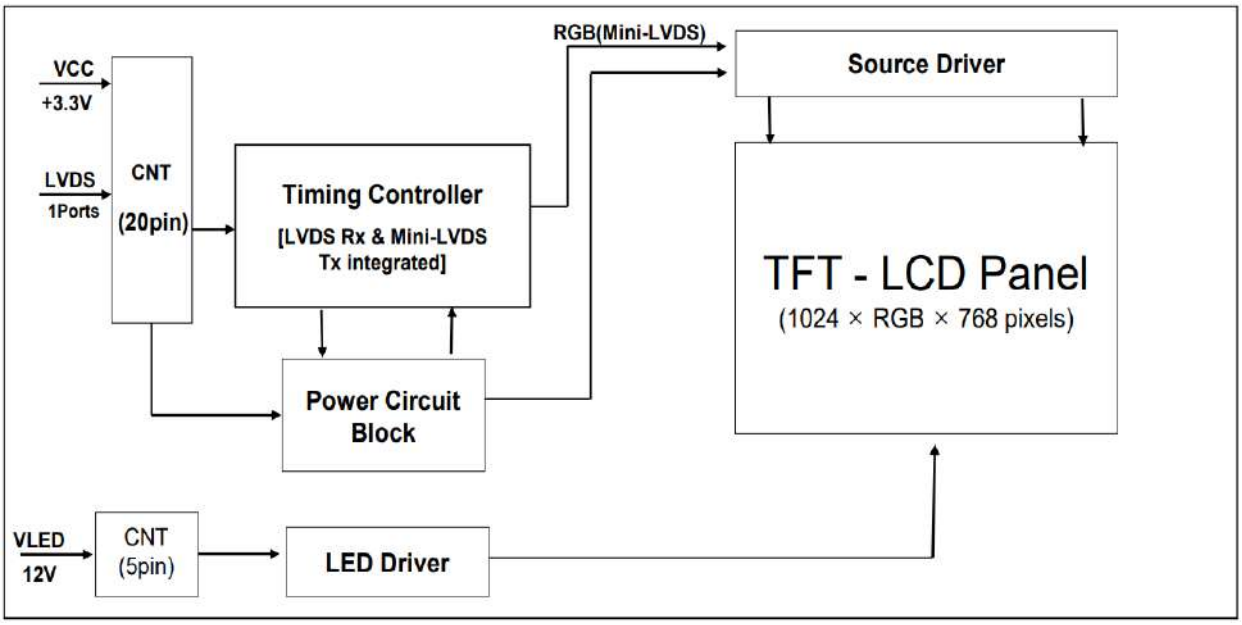


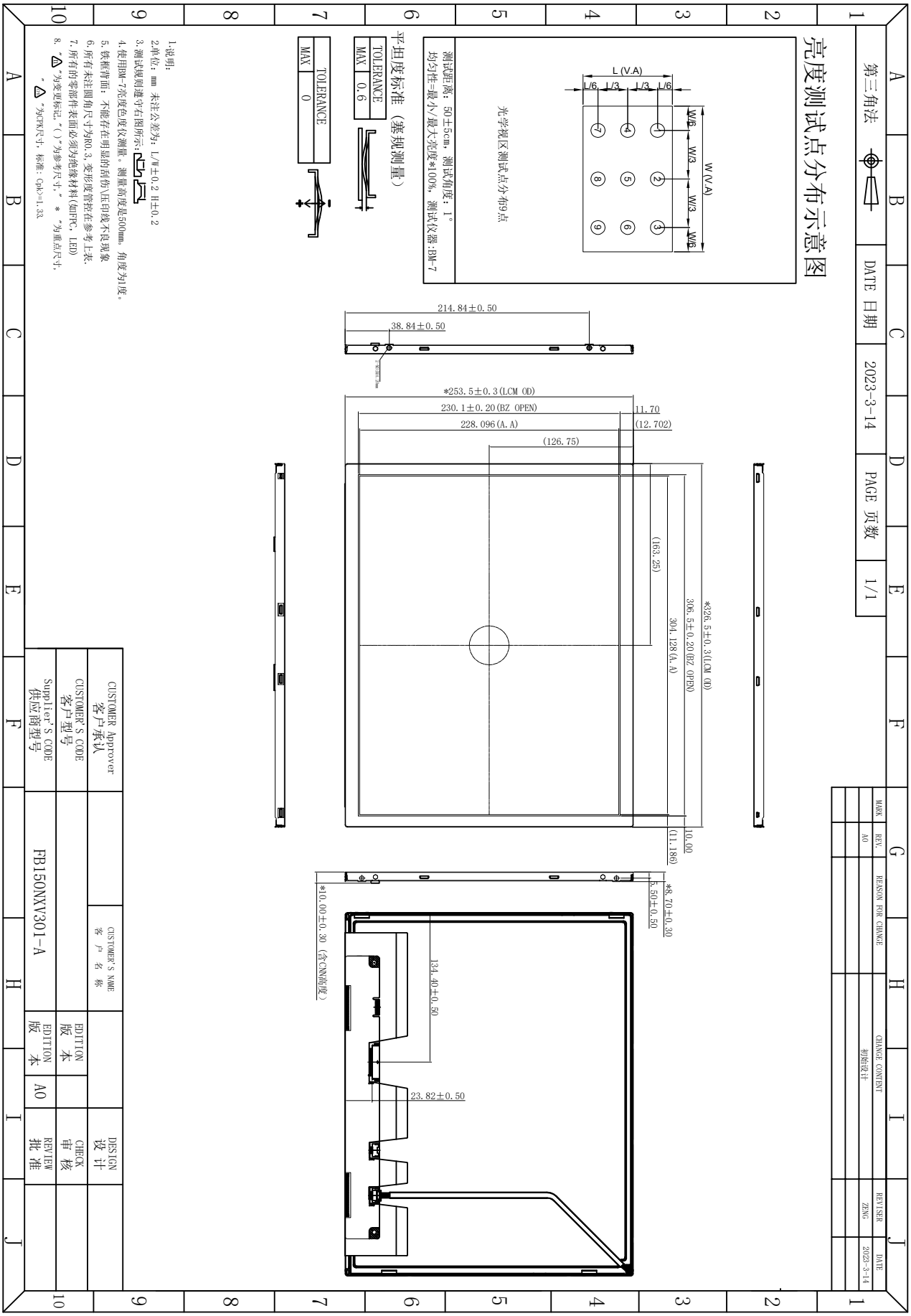
Figure 1. Drive Architecture

1.3 General information

<Table 1. General Specifications>

Item		Specification	Unit	Remarks
Screen Size		15.0	inch	
Outline Dimension		326.5(H) x253.5 (V) x 9.7(body)	mm	Tolerance:±0.3mm
Display area		304.128 (H) × 228.096 (V)	mm	
Number of Pixel		1024(H) x RGB x 768(V)	pixels	
Pixel pitch		0.297(H) x 0.297(V)	mm	
Pixel arrangement		RGB Vertical stripe	/	
Display colors		16.7M（6bit+FRC）		
Chromaticity	**Color gamut**	Typ 70%@CIE1931	/	@C-light
Display mode		Normally Black		
Surface treatment		Anti-Glare		
Surface hardness		3H		
Interface		LVDS	/	
Assy Type		FOB + BL	/	
BACKLIGHT		WHITE LED Backlight	/	
Luminous Intensity forLCM		600 (typ）	cd/m²	
Weight		TBD (Typ.)	gram	

2.DIAGRAM FOR LCM



3. INTERFACE DESCRIPTION

3.1 The electronics interface connector is **STM MSB240420_HE**;The BL connector is Jonhon **88-207-025** The connector interface pin assignments are listed in **Table 2;** The connector BL interface pin assignments are listed in **Table 3.**

<Table 2. Pin Assignments for the Interface Connector>

Pin No	Symbol	Description	Pin No	Symbol	Description
1	VDD	Power Supply,3.3V(typical)	11	RIN2-	-LVDS differential data input
2	VDD	Power Supply,3.3V(typical)	12	RIN2+	+LVDS differential data input
3	GND	Ground	13	GND	Ground
4	NC	No Connection	14	RIN2-	-LVDS differential data input
5	RIN0-	-LVDS differential data input	15	RIN2+	+LVDS differential data input
6	RIN0+	+LVDS differential data input	16	GND	Ground
7	GND	Ground	17	RIN3-	-LVDS differential data input
8	RIN1-	-LVDS differential data input	18	RIN3+	+LVDS differential data input
9	RIN1+	+LVDS differential data input	19	GND	Ground
10	GND	Ground	20	NC	No Connection

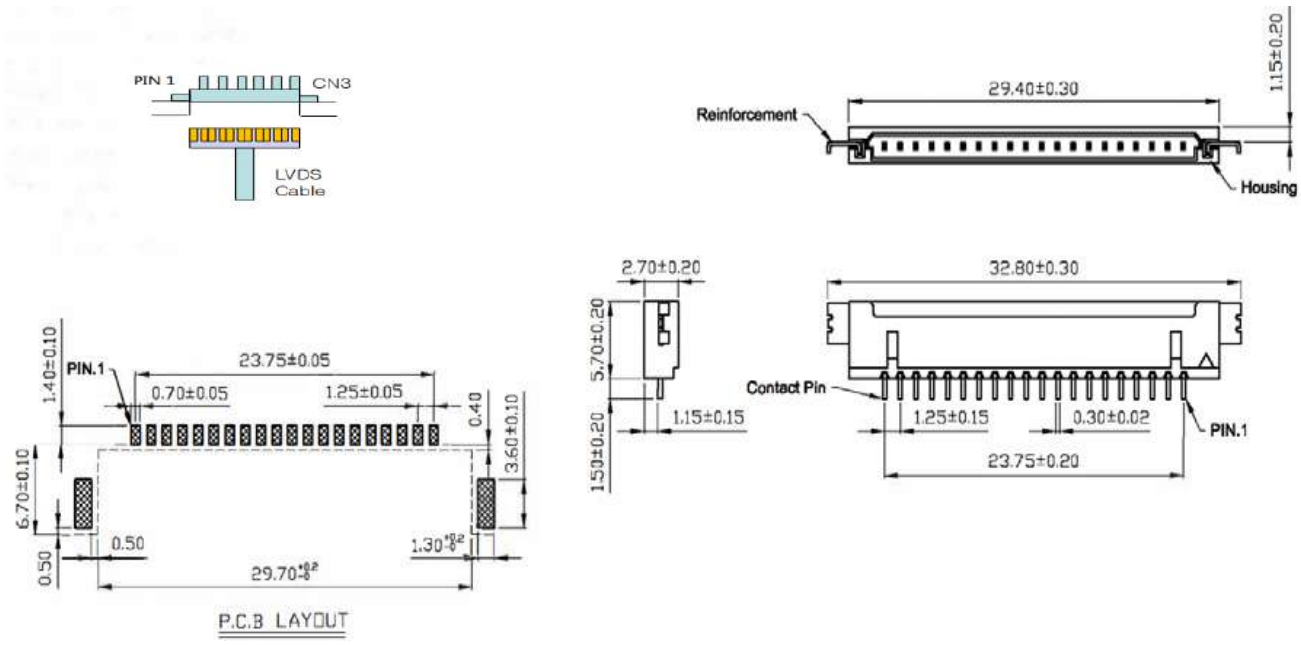


Figure 2. Drawing for the Interface Connector

3.2 <Table 3. Pin Assignments for BL Connector>

Pin No	Symbol	Description
1	NC	No Connection
2	BL_PWM	PWM Dimming Signal
		High：2.5~3.6V
		Low：0~0.6V
		Frequency Range：120~1KHz
3	BL_Enable	LED Enable Signal
		High：2.5~3.6V，BLU On
		Low：0~0.6V，BLU Off
4	GND	Ground
5	VLED	Power Supply,12V(typical)

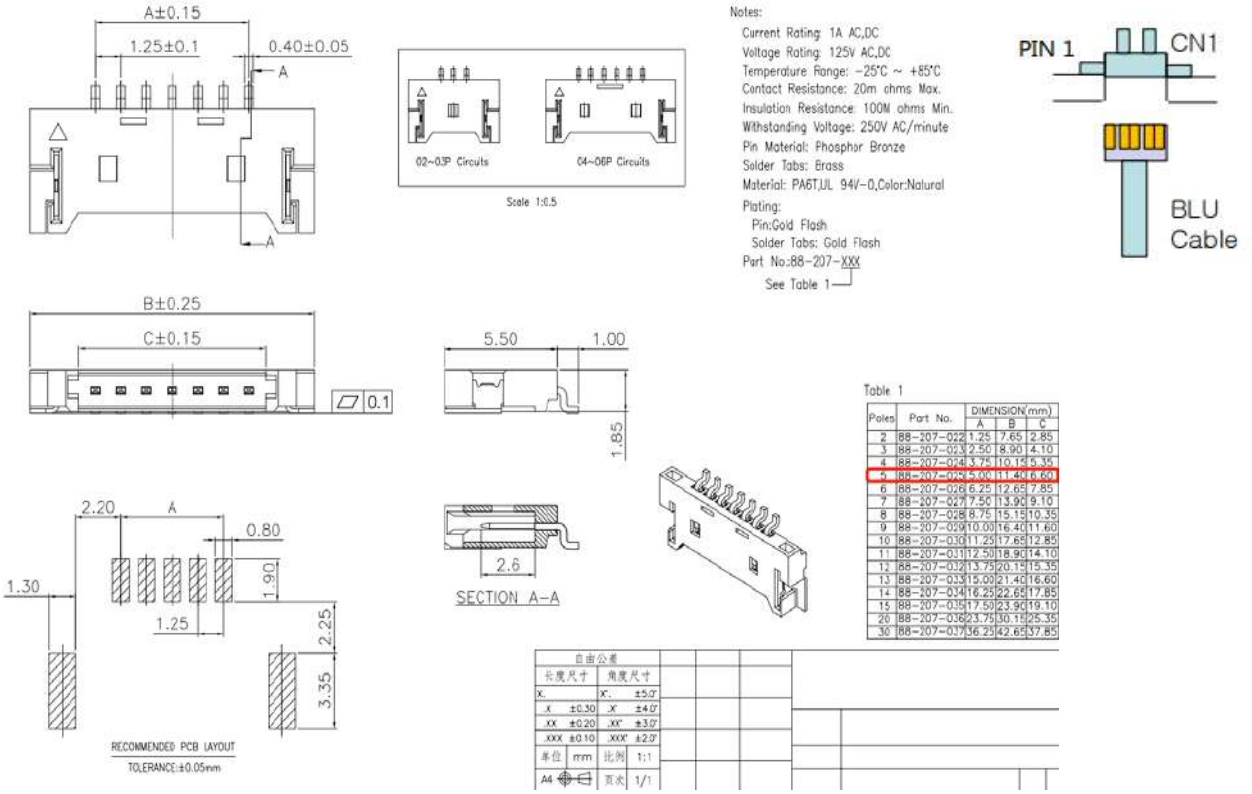
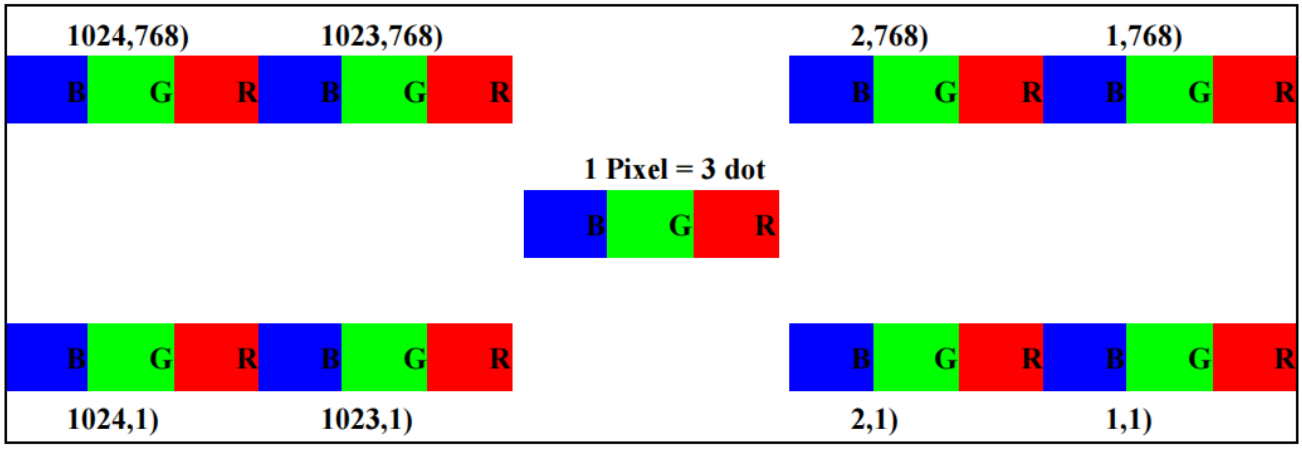


Figure 3. Drawing for BL Connector

3.3 PixelStructure



3.4 Block Diagram of Interface

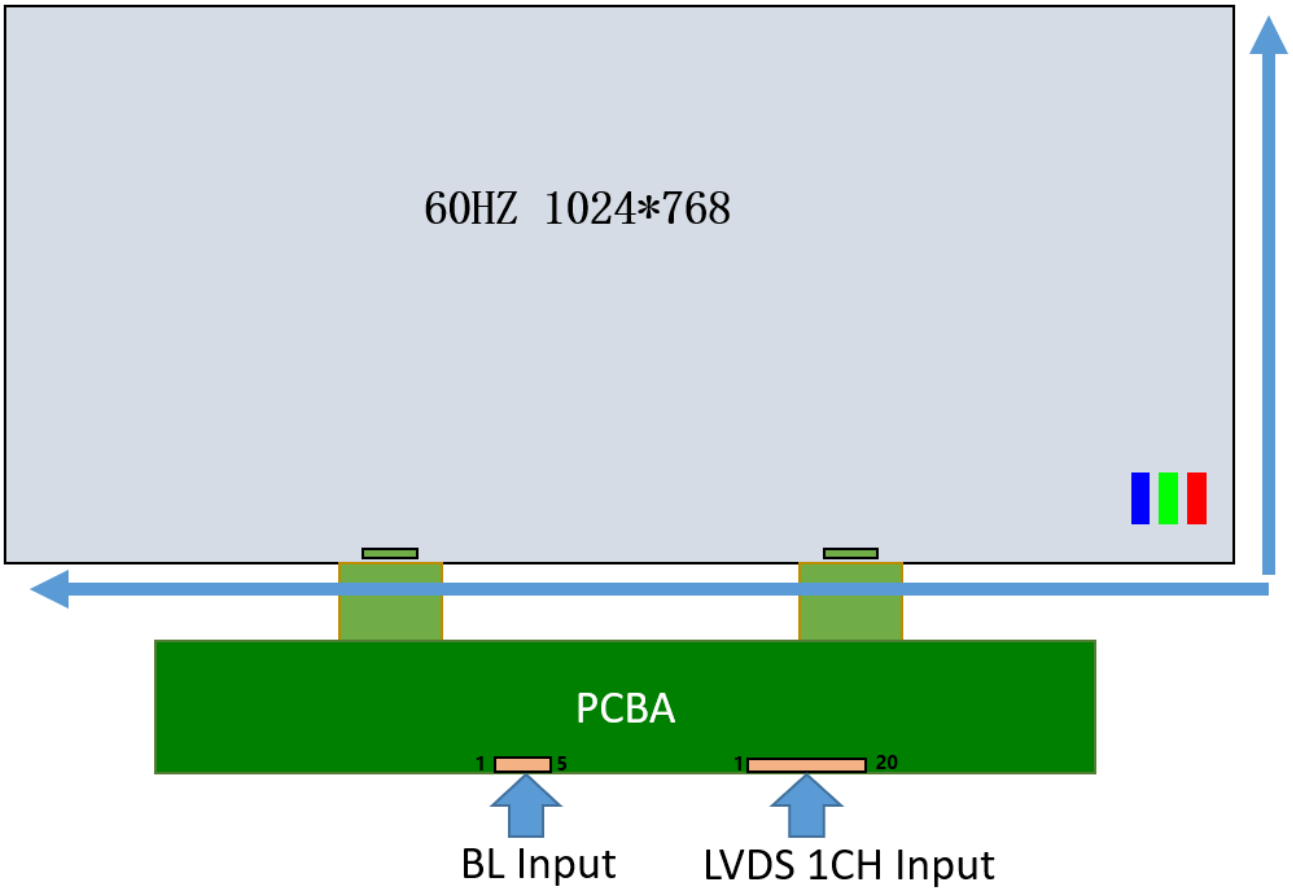


Figure 4. Block Diagram of Interface

4. ABSOLUTE MAXIMUM RATINGS

<Table 4. Absolute Maximum Ratings>

Item	Symbol	Min	TYP	Max	Unit	NOTE
Operating temperature	TOP	**-20**	-	**70**	˚C	(1),(2),(3),(4)
Storage temperature	TST	**-30**	-	**80**	˚C	
B/L Supply Voltage	V_{LED}	4.2	-	24	V	
Power Supply Voltage	VDD	-0.3	-	4.0	V	
Logic Supply Voltage	VIN	Vss-0.3	-	VDD+0.3		

Note (1) All the parameters specified in the table are absolute maximum rating values that may cause faulty
operation or unrecoverable damage, if exceeded.
Note (2) All the contents of electro-optical specifications and display fineness are guaranteed under Normal
Conditions. All the display fineness should be inspected under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 50± 10%RH.
Note (3) Unpredictable results may occur when it was used in extreme conditions. Ta= Ambient Temperature, Tgs= Glass Surface Temperature. All the display fineness should be inspected under normal conditions.
Note (4) Temperature and relative humidity range are shown in the figure below.

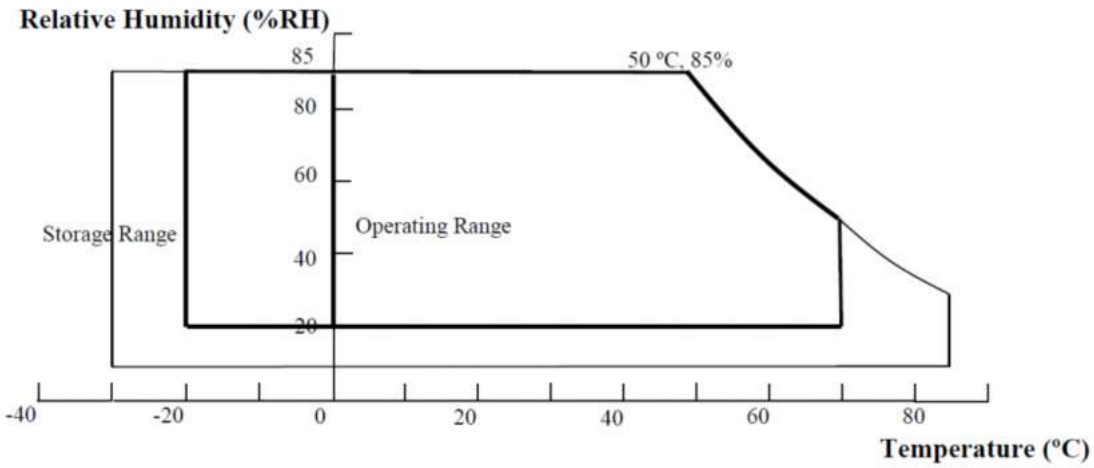


Figure 4. Absolute Ratings of Environment of the LCD Module

5.0 ELECTRICAL SPECIFICATIONS

5.1 Electrical Specifications

<Table 5. Electrical Specifications>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
PowerSupplyVoltage	VCC	3	3.3	3.6	V	Note(3)
PermissibleInputRipple Voltage	VRF	-	-	350	mV	Note(3)
PowerSupplyCurrent	ICC	-	-	TBD	mA	Note(1)
PowerSupplyInrushCurrent	Inrush	-		2	A	Note(2)
PowerConsumption	mosaic	-	-	TBD	W	Note(1)
PowerConsumption	RGB			TBD	W	Note(1)

Notes :

(1)The supply voltage is measured and specified at the interface connector of OC. The current draw and power consumption specified is for 3.3V at 25 ℃ @ Frame rate 60Hz.

a)Typ: Mosaic7x5 pattern

b)Max: R255 pattern

(a) (b)

Figure 5. Power Measure Patterns

(2)Measure condition (Figure 4)

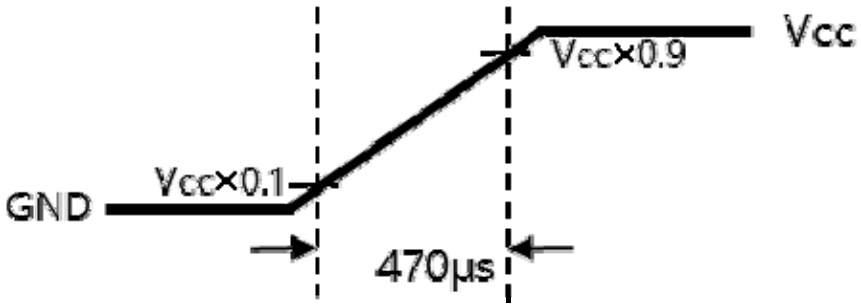


Figure 6. Inrush Measure Condition

(3)Input voltage range:3.0~3.6V,Test condition: Oscilloscope bandwidth 20MHz, AC coupling.

5.2 Backlight Unit

<Table 6. Backlight Unit Electrical Specifications>

Ta=25+/-2°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
LEDLightBarInputCurrent PerInputPin	IF	TBD	55	TBD	mA	Note(4)
LEDDriverPowerInput Voltage	VLED	10.8	12	12.6	V	
LEDDriverPowerInput Current	ILED	TBD	TBD	TBD	mA	
LEDLightBarInputVoltage PerInputPin	Vout	TBD	TBD	TBD	V	Note(3)
PowerSupplyVoltageforLED DriverInrush	Iledinrush			TBD	A	
ENControlLevel(B/LOn)	BL_EN	3	3.3	3.6	V	
ENControlLevel(B/LOff)	BL_EN	0	0	0.6	V	
PWMControlLevel(High Level)	BL_PWM	3	3.3	3.6	V	
PWMControlLevel(Low Level)	BL_PWM	0	0	0.6	V	
PWMControlFrequency	FPWM	0.12		1	KHz	
DutyRatio		5		100	%	

Notes :
(1)LED strips only support 4 strings(parallel) of design
(2)There are one light bar ,and the specified current is input LED chip 100% duty current
(3)LED Light Bar Input Voltage Per Input Pin to 39.5V.
(4)The sense current of each input pin is 55mA

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	10.8	12	12.6	V	Note 1
Current for LED backlight	I_L		500	600	mA	
LED life time	-	30,000	-	-	Hr	Note 2

6.0 TIMING CHARACTERIST

6.1 Signal Timing Specification

<Table 7. Signal Timing Specification>

Parameter	Symbols	PanelResoiution			Unit
		1024RGB*768(1port)			
		Min	Typ.	Max	
LVDSClockfrequency	Fclk	TBD	64.35	TBD	MHz
HorizontalActiveDisplay	THD	TBD	1024	TBD	TCLK
HoriaontalTotal	TH	TBD	1344	TBD	TCLK
VerticalActiveDisplay	TVD	TBD	768	TBD	TH
VerticalTotal	TV	TBD	798	TBD	TH
Framerate	F	TBD	60	TBD	Hz
制式	VESA				
模式	DE				

Attention:The module is operated in DE only mode ,H sync and V sync input signal have no effect on normal operation.

Note:

(1)Please make sure the range of pixel clock follows the following equations:

FCLK（max）≥Fmax × TV × TH × （1+Fclkin_mod （max））

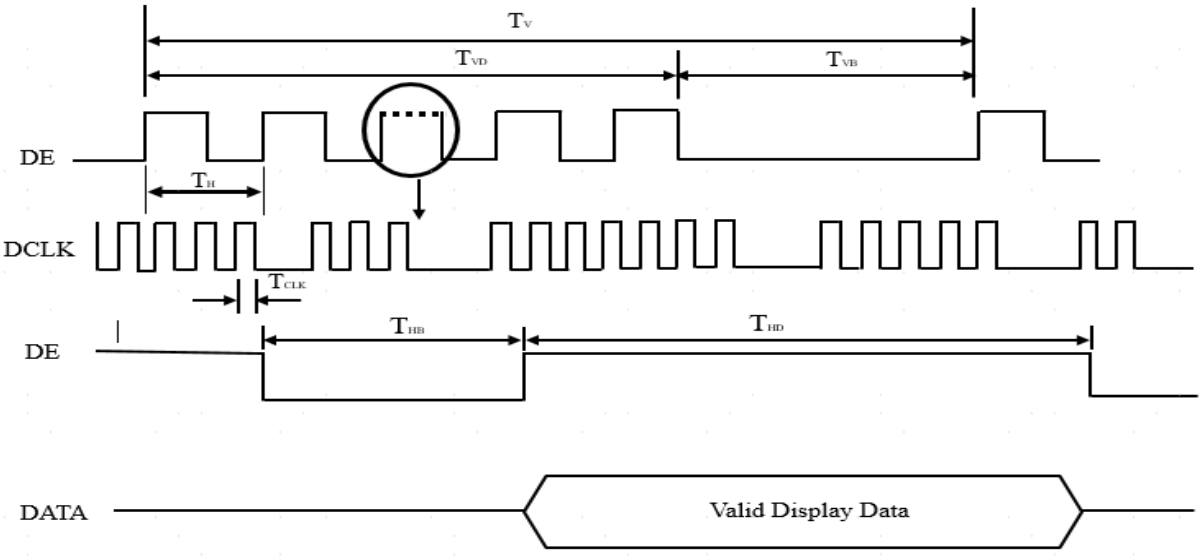


Figure 7. Signal timing diagram

6.2 Signal Electrical Characteristics for LVDS Receiver

The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644) standard.

<Table 8. LVDS mode DC electrical characteristics >

Parameter	Symbol	spec			Unit	Not
		Min	Typ	Max		
DifferentialInputVoltage	VID	100	-	600	mV	
CommonInputVoltage	VCM	1	1.2	1.4	V	
DifferentialInputHigh ThresholdVoltage	VTH	0.1	-	-	V	
DifferentialInputLow ThresholdVoltage	VTL	-	-	-0.1	V	
Spreadspectrummodulation range	Fclkin_mod	Fclkin-3%		Fclkin+3%	MHz	
Spreadspectrum modulationfrequency	FSSM	30	-	200	KHz	
ReceiverSkewMargin	TRMS	-400		400	ps	
TerminatingResistor	RT	90	100	110	ohm	
Inputcycletocyclejitter	Trcl	-	-	200	ps	

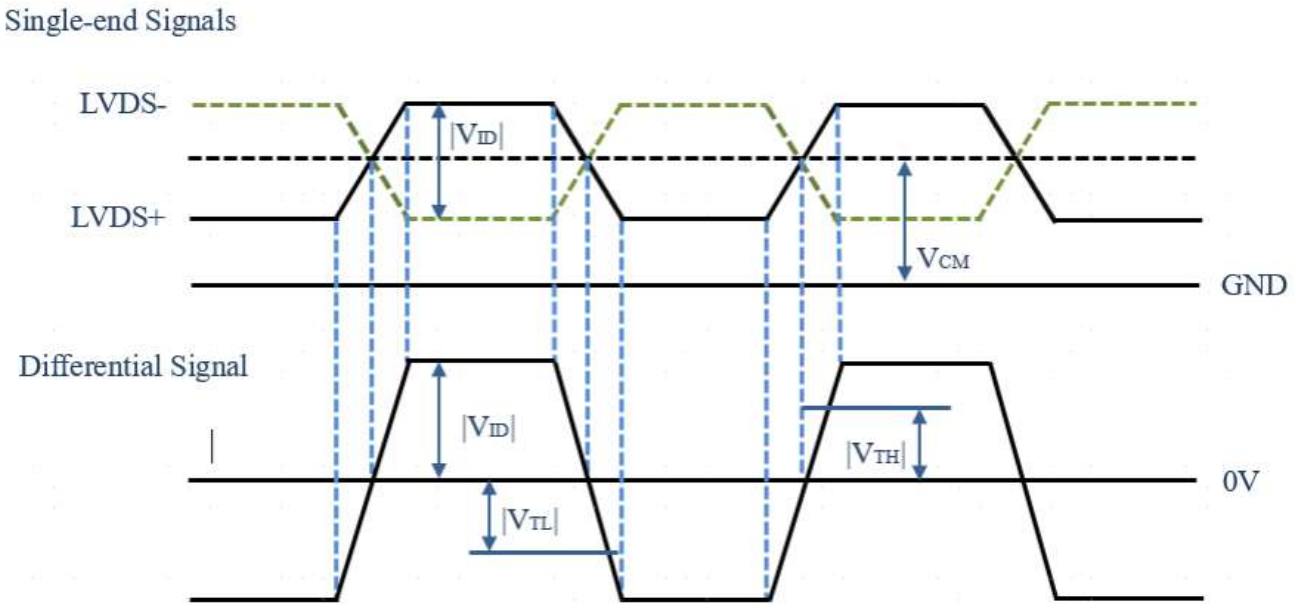


Figure 8. LVDS mode DC electrical characteristics

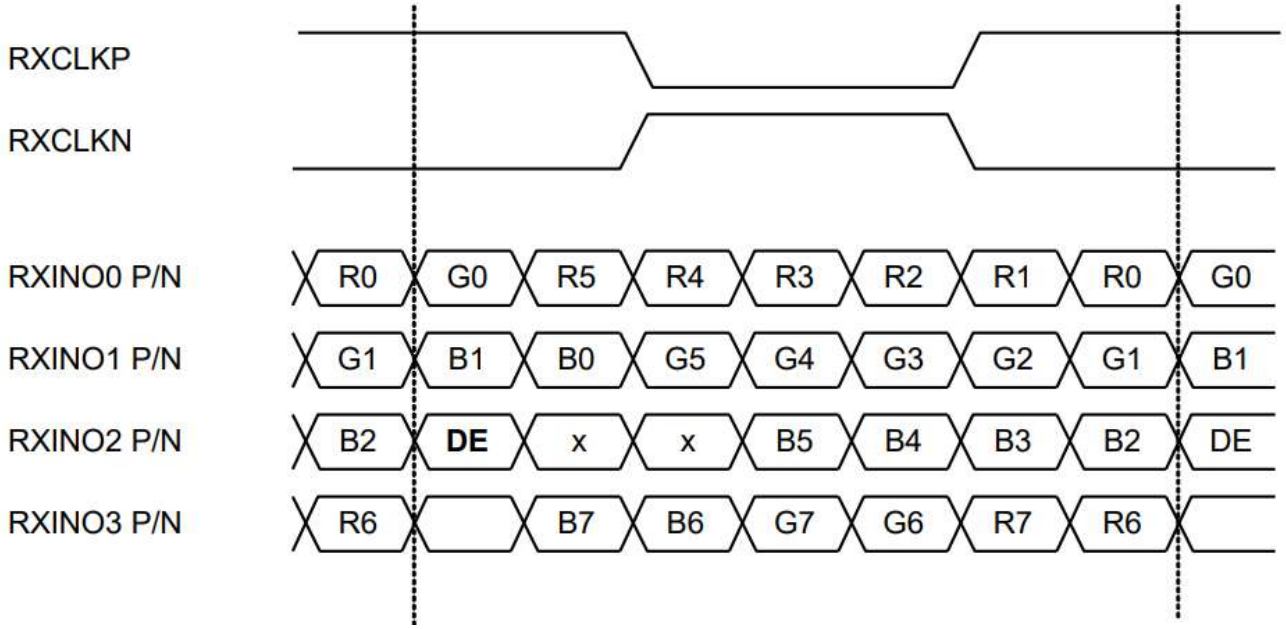


Figure 9. 1-port LVDS signals, VESA format (8-bit)

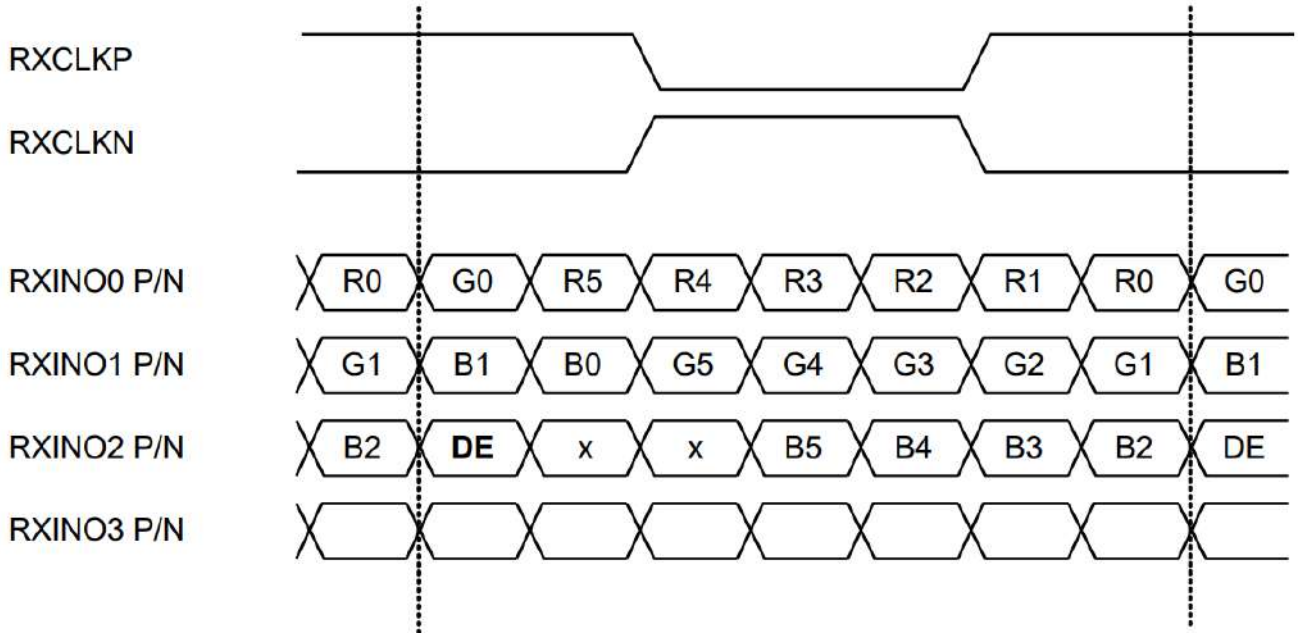


Figure 10. 1-port LVDS signals, VESA format (6-bit)

6.3 Power ON/OFF Sequence

The power sequence specification are shown as the following table and diagram.

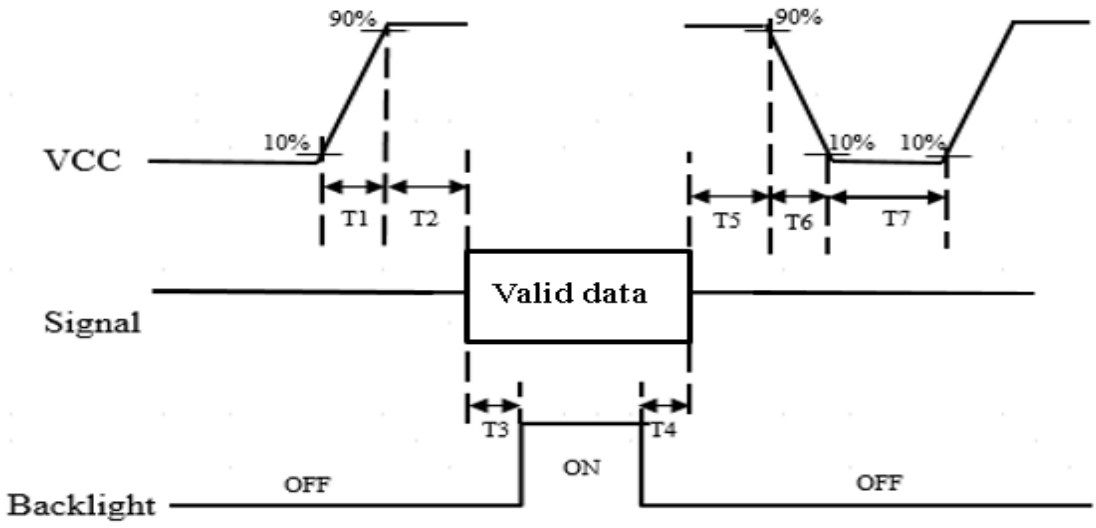


Figure 11. Power on/off signal sequence

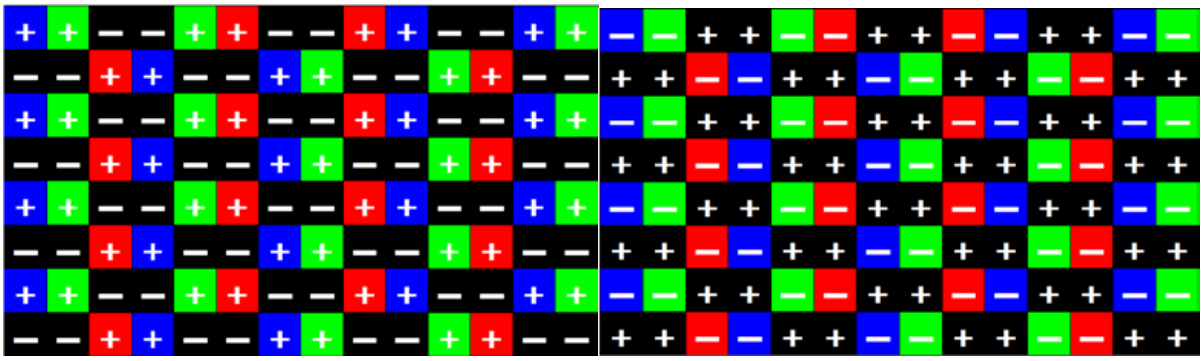
Parameter	Values			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	ms
T2	0	30	50	ms
T3	450	-	-	ms
T4	100	250	-	ms
T5	0	20	50	ms
T6	0.1	-	100	ms
T7	1000			ms

Note:
(1)The supply voltage of the external system for the module input should be the same as the definition .
(2)To avoid some abnormal display noise, we suggest “VCC falling time” to follow “T6” definition.
(3)In case of VCC is off level, please keep the level of input signals on the low or keep high impedance.

7.0 Fliker Adjustment(Fliker

7.1 Flicker must be optimized after module assembly and aging.

Its patterns are as follow:



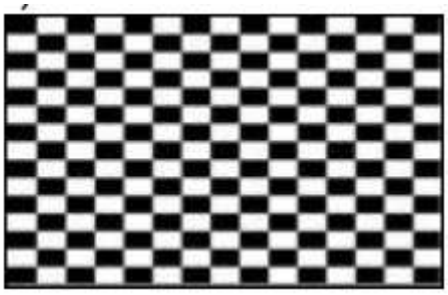
Frame N Frame N+1

Figure 16. Bright sub-pixel=G127(50% grayscale); Dark sub-pixel=G0（0% grayscale）

Parameter		Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	VDD	3.0	3.3	3.6	V	Note 1
Permissible Input Ripple Voltage	V_{RF}	-	-	100	MV	At V_{DD}= 3.3V
Power Supply Current	I_{DD}	-	212	300	MA	Note 1
Differential Input Voltage	V_{ID}	200	-	600	mV	
Power Consumption	P_D	-	0.7	1.0	W	Note 1

Notes :

1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25℃.
a) Typ : Mosaic Pattern
b) Max : R/G/B Pattern



8.OPTICAL SPECIFICATION

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color	Red	Rx	θx=0°,θy=0°, Viewing Angleat Normal Direction atcenter pointof panel LightSource isClight	-0.03	0.647	+0.03	-	(1)
Chromaticity(CIE 1931)		Ry			0.318			
	Green	Gx			0.3115			
		Gy			0.6345			
	Blue	Bx			0.1386			
		By			0.0443			
	White	Wx			0.313			
		Wy			0.329			
ColorGamut		CG		-	72%	-	%	(2)
Celltransmittance		T%		-6.35%	-7.5%			(3)
ContrastRatio		CR	θx=0°,θy=0°	400：1	700:1	-	-	(4)
ResponseTime		Tg		8	12	-	ms	(5)
ViewingAngle	Horizontal	θx+	CR≧10 θx=0°,θy=0°	80	85	-	Deg.	(6)
		θx-		80	85	-		
	Vertical	θy+		80	85	-		
		θy-		80	85	-		

Notes:
(1) The color chromaticity coordinates(Under C-light) specified in Table 12 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
(2) The color gamut is defined as the fraction in percent of the area of the triangle bounded by R, G, B coordinates and the area is defined by NTSC sRGB1931 color standard in the CIE color space.
(3) Definition of Transmittance (T%):
(4) The transmittance is measured with full white pattern (Lmax) at the center of the LCD pane
(5) Transmittance (T%) =
(Under C-light)
(6) Definition of Contrast Ratio (CR):
The contrast ratio can be calculated by the following expression,
Contrast Ratio (CR): CR =
CR_W : Luminance of LCD module with full screen white pattern (255,255,255) at center point.
CR_D : Luminance of LCD module with full screen Dark pattern (0,0,0) at center point.
Where the measure point of to the Contrast Ratio is the center of the panel.
(7) Definition of Response time (Tg):
Average switching time of luminance ratios among 10% and 90% to each other and is optimized on frame Rate = 60Hz.

Table 13. Switching time of luminance ratios matrix

Measured Response time		To	
		10%	90%
From	10%		$T_{10\% \text{ to } 90\%}$
	90%	$T_{90\% \text{ to } 10\%}$	

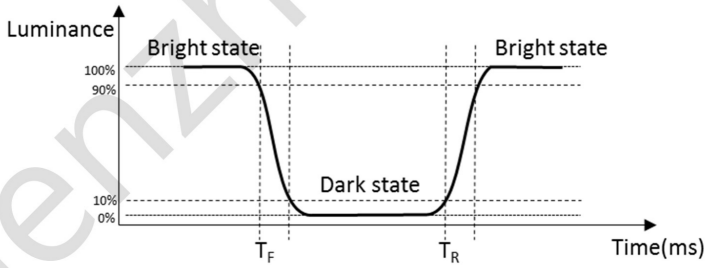


Figure 8. The definition of T_R and T_F

Measured response time is determined by 10% to 90% brightness difference of rising (T_R) or falling (T_F) time.

(8) Definition of Viewing angle:

As Note (4) the static contrast ratio definition, the viewing angles are defined at the angle that the contrast ratio is larger than 10 at four directions relative to the perpendicular direction of the Guoyu's module (two vertical angles: up θy+ and down θy-; and two horizontal angles: right θx+ and left θx-). The standard setup of measurement is shown in Figure 9&10.

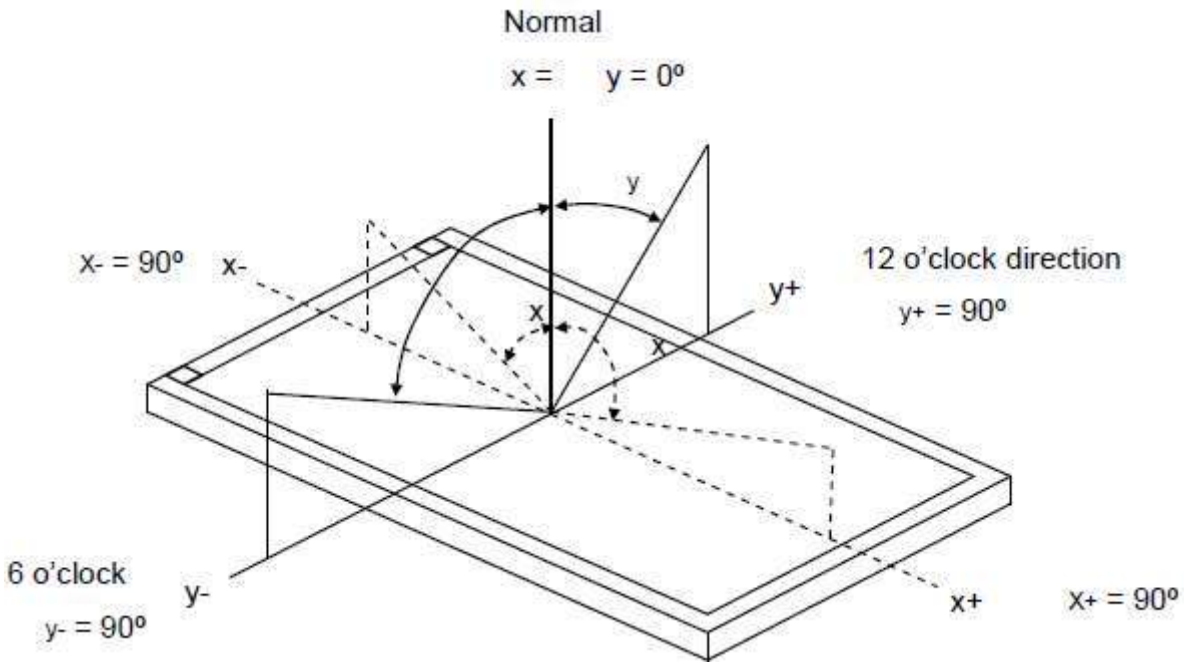


Figure 9. Definition of Viewing angle

Optical Measurements

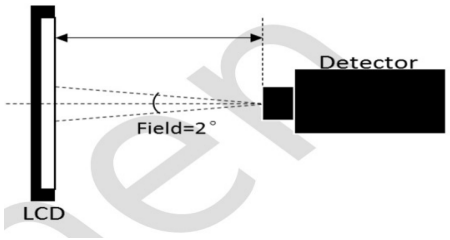


Figure 10. Measurement equipment

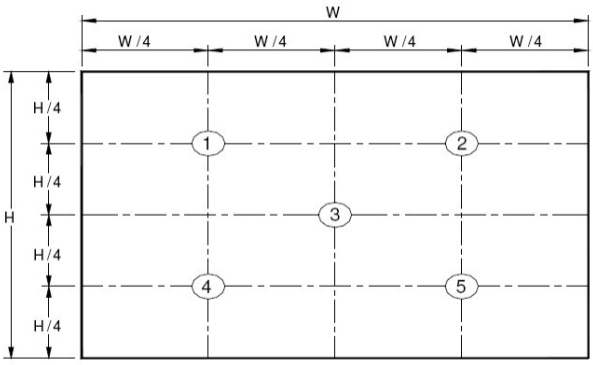


Figure 11. White Luminance Measurement Locations (5 points)

Center Luminance of white is defined as luminance values of 5 point average across 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 11 for a total of the measurements per display.

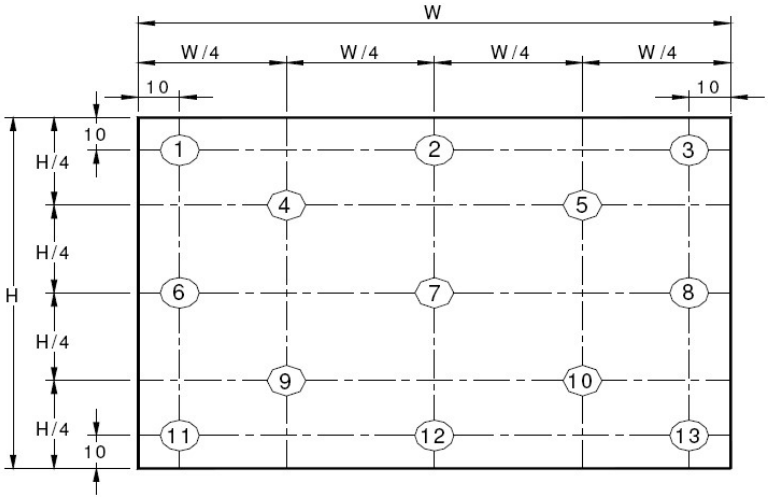


Figure 12. Uniformity Measurement Locations (13 points)

The White luminance uniformity on LCD surface is then expressed as: ΔY13 = Minimum Luminance of 13 points /Maximum Luminance of 13 points(see Figure 12).

9. RELIABILITY TEST CONDITIONS

No	Test Item	Test Condition	STANDARD
1	High Temperature Storage	+80°C / 96Hours	1. Functional test is OK. Missing Segment, short, unclear segment, on-display, display abnormally and liquid crystal leak are un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temperature Storage	-30°C / 96Hours	
3	High Temperature Operating	+70°C / 96Hours	
4	Low Temperature Operating	-20°C / 96Hours	
5	Thermal and cold shock	-0°C⇆+50°C x 10cycles (30min) (5min) (30min)	
6	Operate at High Temperature and Humidity	50°C x 80%RH / 96H	
7	Vibration Test	Frequency: 10Hz~55Hz~10Hz Amplitude:1.5mm, 2 hours for each direction of X, Y, Z	1. Function test is OK. 2. No glass crack, chipped glass, end seal loose and fall, epoxy frame crack and so on. 3. No structure loose and fall.
8	Dropping test	Drop to the ground from 1m height, 1 corner, 3 edges, 6 surfaces.	
9	ESD test	Contact: ±6KV Air: ±8KV 150PF/330Ω,5Points/panel,5times	The test results shall be subject to the whole machine test.

NOTE:

1. The reliability items will be fully performed in new sample qualification,
2 .The reliability status will be tested as monitor during mass production. Individual reliability test shall be performed by lot , Moreover, the individual reliability item shall be decided according to reliability plan.
3. All samples are inspected after keeping in the room with normal temperature and humidity for 2 hours or above.
4. Vibration test: It is not necessary to test for those products without assembly frame , backlight , PCB and so on.
5. Dropping test : It is necessary for affirming new package.
6. For the high temperature and high humidity test, pure water of over 10 MΩ.cm should be used.
7. Each test item applies for test LCM only once .Then tested LCM cannot be used again in any other test item.
8. The quantity of LCM examination for each test item is 5pcs to 10pcs.

10、 PRECAUTIONS FOR USING LCD MODULES

10.1 Using LCD Modules

10.1.1 As glass is fragile, It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.

10.1.2 Do not apply excessive force to the display surface or the adjoining ares since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals(some cosmetics are determined to the polarizer)

10.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on it. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming in to contact with room temperature air.

10.1.5 If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents: Isopropyl alcohol; Ethyl alcohol . Do not scrub hard to avoid damaging the display surface

10.1.6 Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following: Water, Ketone, Aromatic solvents. Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contact with oil and fats.

10.1.7 Do not attempt to disassemble or process the LCD module.

10.1.8 Electro-Static Discharge Control, Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.9 Input logic voltage before apply analog high voltage such as LCD driving voltage when power on. Remove analog high voltage before logic voltage when power off the module. Input each signal after the positive/negative voltage becomes stable.

10.1.10 In the use of connector products, the operating process of attention to turn off the power before pull off and insert action. To avoid damage to the module

10.1.11 When use LENS ,you must be do the following things

10.1.12 Precaution for assemble the module with BTB connector: Please note t he position of the male and female connector position, don’t assemble or asse mble like the method which the following picture shows

10.1.13 The polarizer surface should not come in contact with any other objects (We advise you to store them in the anti-static electricity container in which they were shipped).

10.1.14 Iron head temperature: 350±10˚C， Soldering time: <3-4S. Soldering don't repeat above 3 times

10.1.15 If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation (This does not apply in the of a non-halogen type of flux). It is recommended that you protect the LCD surface case with a cover during soldering to prevent any damage due to flux spatters.

10.1.16 The gap between the backlight bottom and the shell material shall be 0.3mm min. if the shell material is all plastic, the gap shall be 0.4mm min0.3mm min， 0.4mm min)

10.1.17 The back backlight area corresponding to the LCM visual area is recommended to be free of adhesion and resistance of auxiliary materials and foreign matters, so as to avoid poor display caused by top injury of backlight film material;

10.1.18 Due to the characteristics of LCD, the screen cannot be displayed in fixed mode (static mode) for a long time, resulting in residual shadows; If the screen has multiple display modes (static and dynamic), add a screen saver

10.2 Storage Modules

10.2.1 Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C, and keep the relative humidity between 40%RH and 60%RH.