EV101WXM-N80 Product Specification Rev.P1

HEFEI BOE OPTOELECTRONICS TECHNOLOGY

REVISION HISTORY

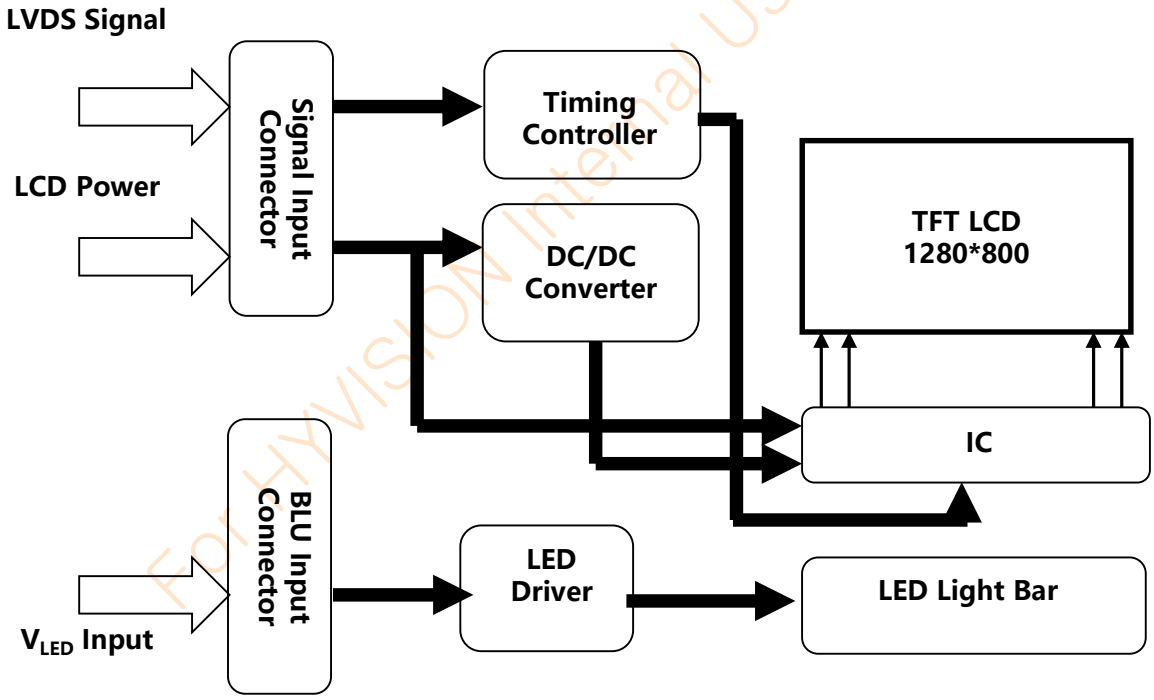
REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0		Initial Release	2018-03-20	Leon Zhang
P1		Update optical & electronical characters	2018-07-09	Leon Zhang

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

EV101WXM-N80 is a color active matrix TFT LCD module using amorphous silicon TFT 's (Thin Film Transistors) as an active switching devices. This module has a 10.1 inch diagonally measured active area with WXGA resolutions (1280 horizontal by 800 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.2M colors.



1.2 Features

- 1 Port LVDS Interface Input;
- 6+2bit color depth, display 16.2M colors
- Thin and light weight
- High luminance and contrast ratio, low reflection and wide viewing angle
- RoHS compliant

1.3 Application

- Medical Monitor

1.4 General Specification

The followings are general specifications at the EV101WXM-N80-3850

<Table 1. LCD Module Specifications>

Parameter	Specification	Unit	Remarks
Active Area	216.96 (H) × 135.6(V)	mm	
Number Of Pixels	1280(H)×800(V)	pixels	
Pixel Pitch	56.5(H) × RGB × 169.5(V)	um	
Pixel Arrangement	Pixels RGB stripe arrangement		
Display Mode	Normally Black		
Display Colors	16.2M	colors	6+ FRC
Surface Treatment	Normal		
Contrast Ratio	900:1(typ); 700:1(min)		
Viewing Angle(CR>10)	85/85/85/85(typ); 80/80/80/80(min)	deg.	
Response Time	30(typ); 40(max)	ms	
Color Gamut	48%(typ); 43%(min)		
Brightness	400 nit(typ); 340 nit(min)	cd/m2	
Brightness Uniformity	9 point: min 65% (Before RA) 9 point: min 60% (After RA)		
Power Consumption	3.4(typ.)	watt	
Outline Dimension	233.2(H)*152.9(V)*6.70(typ)(LCM)	mm	
Weight	505	gram	

2.0 ABSOLUTE MAXIMUM RATINGS

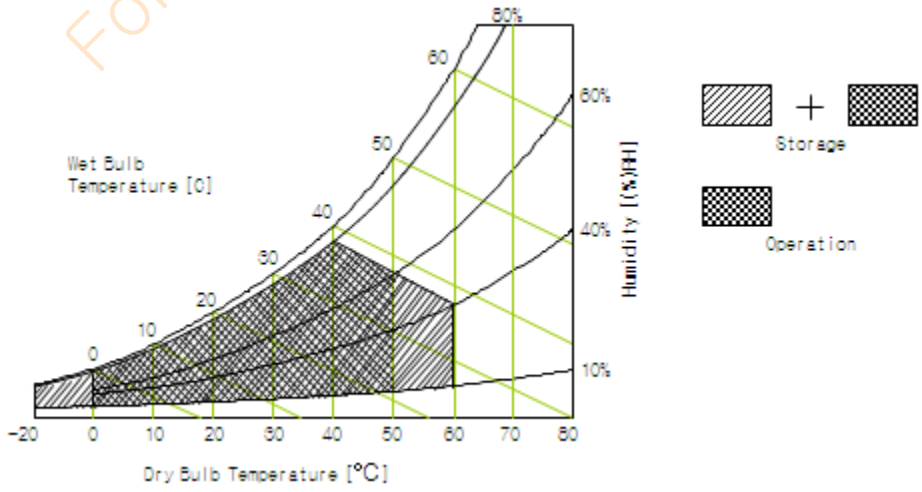
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Absolute Maximum Ratings>

Parameter		Symbol	Min.	Max.	Unit	Remarks
Power Supply	LCD Module	VDD	VSS-0.3	4.0	V	Ta = 25 ℃
	BLU	VLED	VSS-0.3	13.2	V	
		PWM	VSS-0.3	6	V	
		BRTC	VSS-0.3	6	V	
Operating Temperature		T_{OP}	-20	+70	℃	Note 1
Storage Temperature		T_{ST}	-30	+80	℃	

Note :

1. These range above is maximum value not the actual operating temperature . Actual Operating temperature is no more than 40℃ and temperature refers to the Panel surface temperature ;
2. Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be 39 ℃ max. and no condensation of water.



3.0 ELECTRICAL SPECIFICATIONS

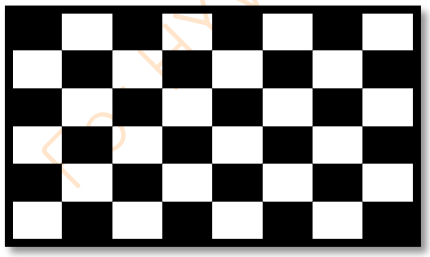
3.1 TFT LCD Module

< Table 3. LCD Module Electrical specifications > [Ta =25±2 ℃]

Parameter	Symbol	Values			Unit	Notes
		Min.	Typ.	Max.		
Power Supply Voltage	VCC	3.0	3.3	3.6	V	Signal
Power Supply Current	I_{VCC}	-	250	330	mA	Note 1
Power Consumption	P_{LCD}	-	0.80	1.10	W	

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VBAT=3.8V, Frame rate f_V=60Hz and Clock frequency = 156.8MHz. Test Pattern of power supply current

a) Typ : Mosaic 8 x 6 Pattern(L0/L255)



b) Max : L255

3.2 Back-Light Unit

Table 4. LED Driver Electrical Specifications > [Ta =25±2 ℃]

Parameter		Symbol	Values			Unit	Notes
			Min.	Typ.	Max.		
BLU Supply Voltage		VDD	11.5	12	12.5	V	
BLU Forward Current		I_{VDD}	-	220	280	mA	
Power Consumption		PLED	-	2.6	-	W	Note 1
BLU on/off Level		BLU on	3.0	3.3	3.4	V	
		BLU off	0		0.5	V	
PWMIN	Level	High Level	3.0	3.3	3.6	V	
		Low Level	0		0.5	V	
	Frequency	F_{PWM}	180	200	10K	Hz	
	Duty Ratio	D_{PWM}	5	-	100	%	
LED Quantity		QLED	-	32	-	EA	
LED Life Time		TLED	30000	-	-	Hrs	Note 2

Notes:

1. PLED = VDD ×I_{VDD} (Without LED converter transfer efficiency)
2. The life time of LED, 30,000Hrs, is determined as the time at which luminance of the LED is 50% compared to that of initial value at the typical LED current on condition of continuous operating at 25 ± 2°C.

3.3 INPUT TERMINAL PIN ASSIGNMENT

This LCD employs two interface connections, a 20 pin ZIF connector is used for the LCD module electronics interface and a 9 pin ZIF connector is used for the internal backlight system.

3.3.1 Pin assignment for LCD module

Connector : DF19G-20P-1H (56) or equivalent

< Table 5. Pin Assignment for LCD Module Connector >

Pin No.	Symbol	Description	Remark
1	VCC	Power supply	
2	VCC	Power supply	
3	N.C.	Not connect	
4	GND	Ground	
5	D0-	Pixel data	
6	D0+	Pixel data	
7	GND	Ground	
8	D1-	Pixel data	
9	D1+	Pixel data	
10	GND	Ground	
11	D2-	Pixel data	
12	D2+	Pixel data	
13	GND	Ground	
14	CLK-	CLK data	
15	CLK+	CLK data	
16	GND	Ground	
17	SDA	Not connect	NC
18	SCL	Not connect	NC
19	D3-	Pixel data	
20	D3+	Pixel data	

3.4.2 Pin assignment for LED Bar

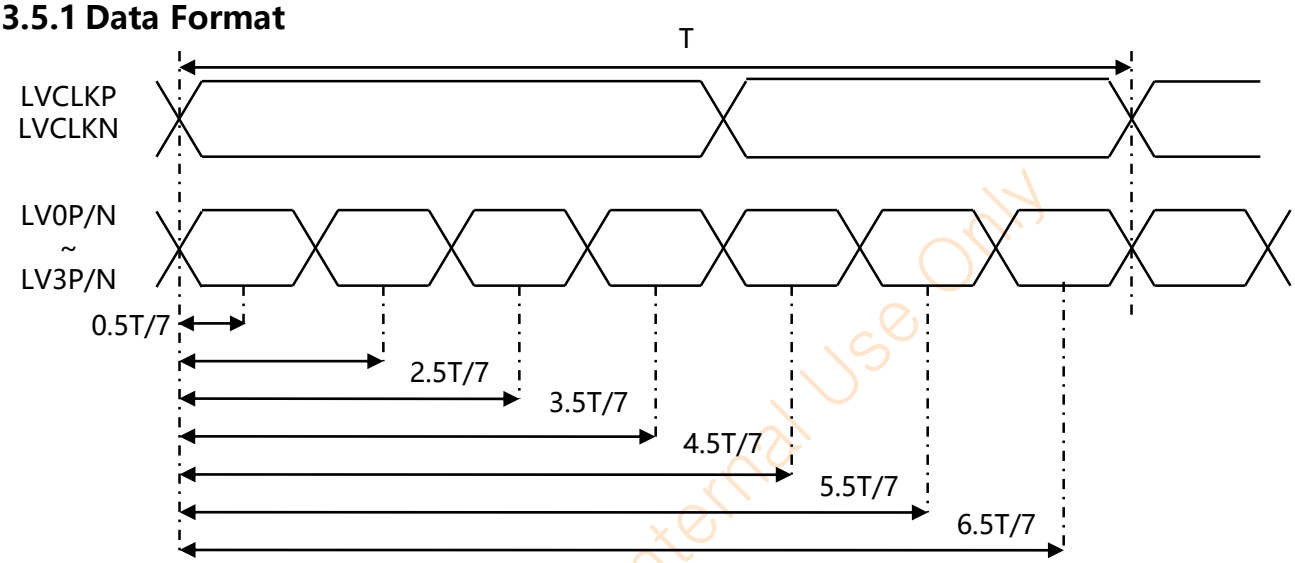
Connector : PF040-B09B-C09 (STM) or equivalent

< Table 6. Pin assignment for LED Bar >

Pin No	Symbol	Description	Remarks
1	PWM	Luminance control	
2	BRTC	Backlight ON/OFF control	High or Open： Backlight ON Low： Backlight OFF
3	GND	Ground	
4	GND	Ground	
5	VDD	Power supply	
6	VDD	Power supply	

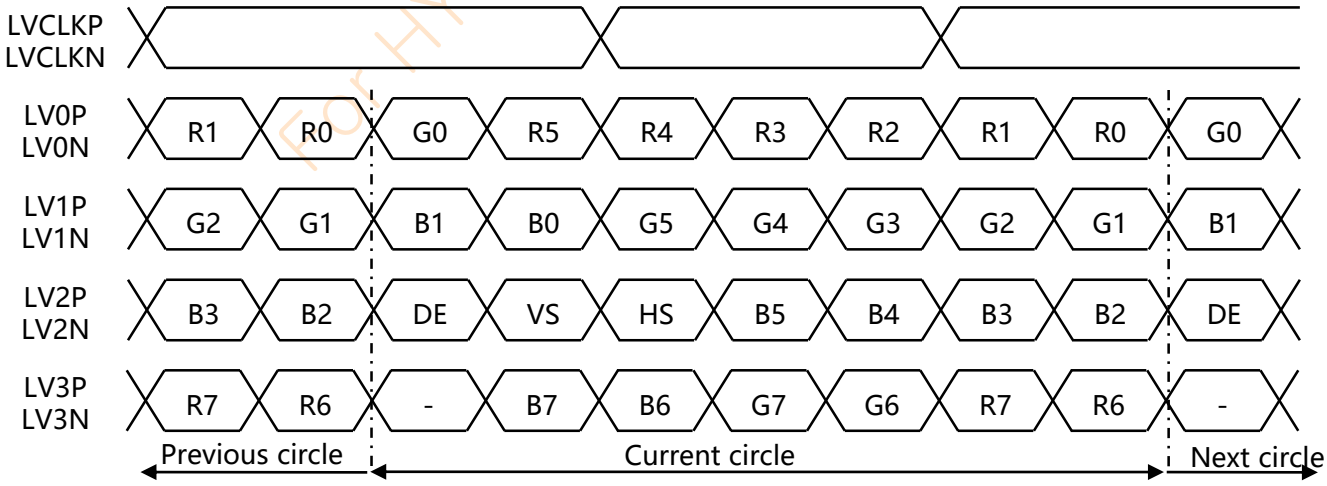
3.5 LVDS Interface Characteristic

3.5.1 Data Format



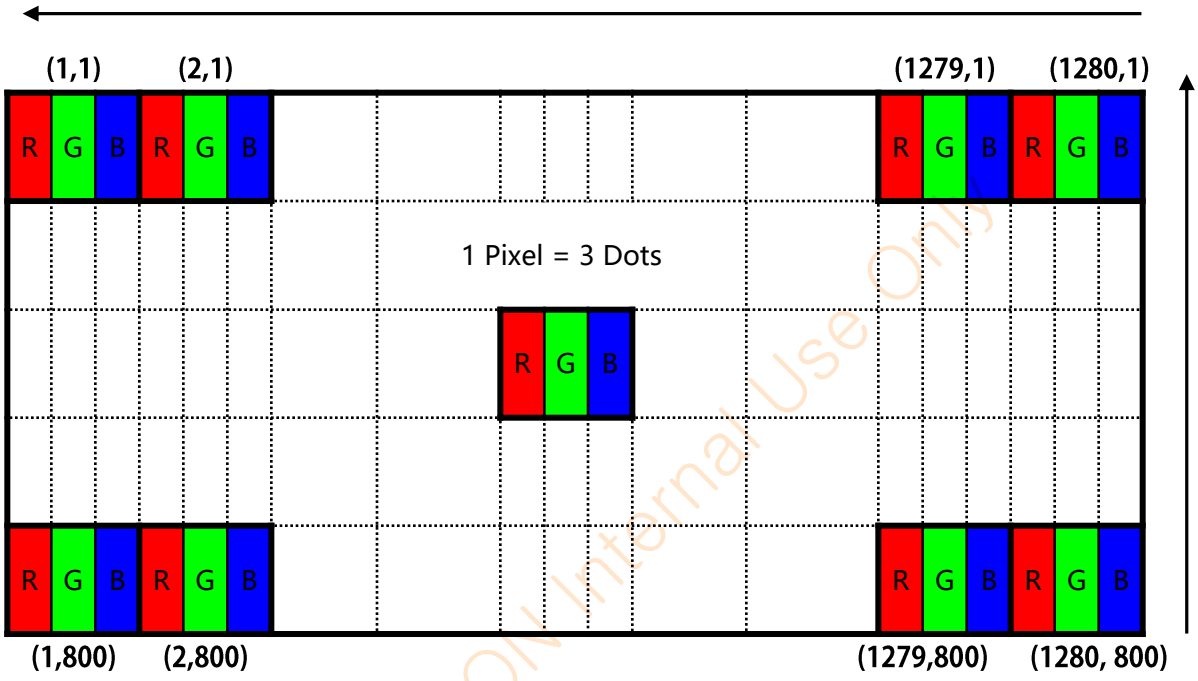
< LVDS input data ideal strobe position >

3.5.2 LVDS input data mapping



< 8 bit LVDS input data mapping >

3.5.3 Pixel Format

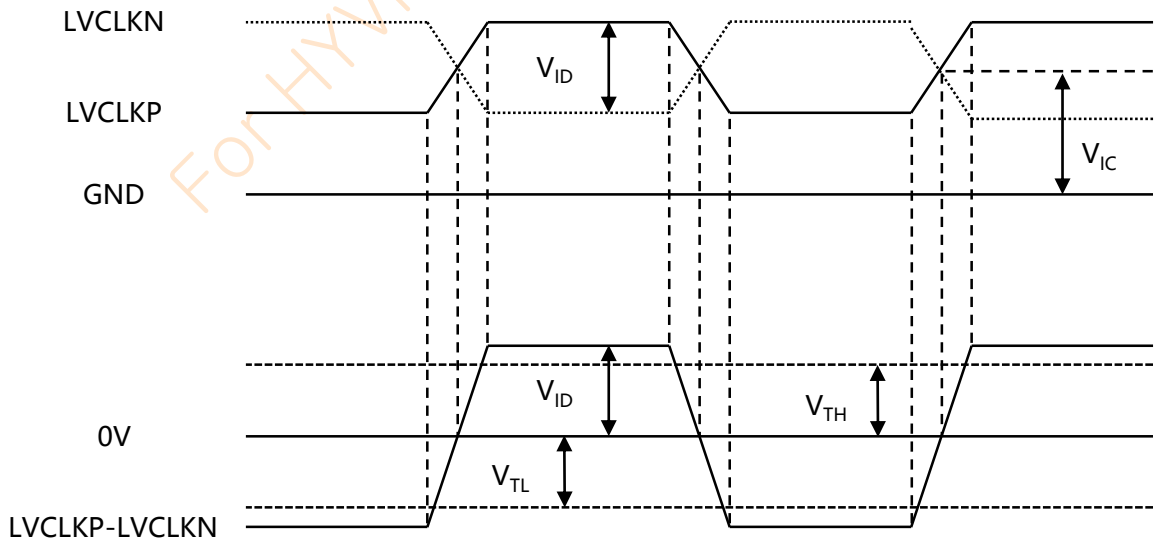


Display Position of Input Data (V-H)

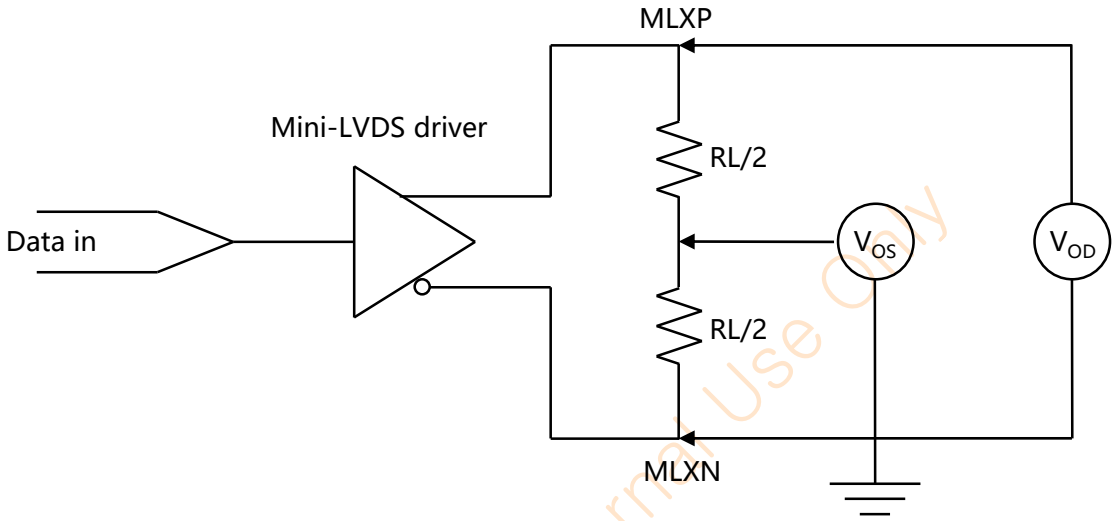
3.5.2 DC Specification

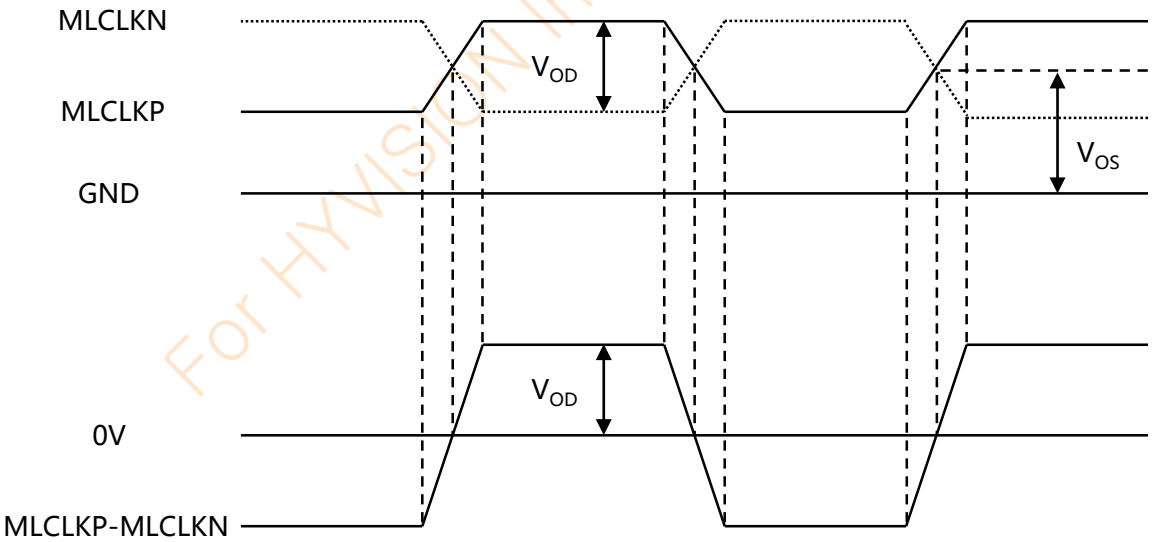
< Table 7. DC Specification >

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Supply current	I_{DD}	-	100	-	mA	
LVDS DC specifications						
Differential input high threshold	V_{TH}	-	-	+100	mV	V_{IC}=1.2V
Differential input low threshold	V_{TL}	-100	-	-	mV	
LVDS common mode voltage	V_{IC}	0.9	-	1.4	V	
LVDS swing voltage	V_{ID}	±100	-	±600	mV	
Mini-LVDS DC specifications						
Output differential voltage range	V_{OD}	±170	±200	±230	mV	PI=14KΩ RL=100Ω (T_A=25℃)
Output differential voltage deviation		0.64	-	0.96	mV	
Output offset voltage range	V_{OS}	1.1	1.2	1.3	V	
Output offset voltage deviation		1.1	1.2	1.3	V	



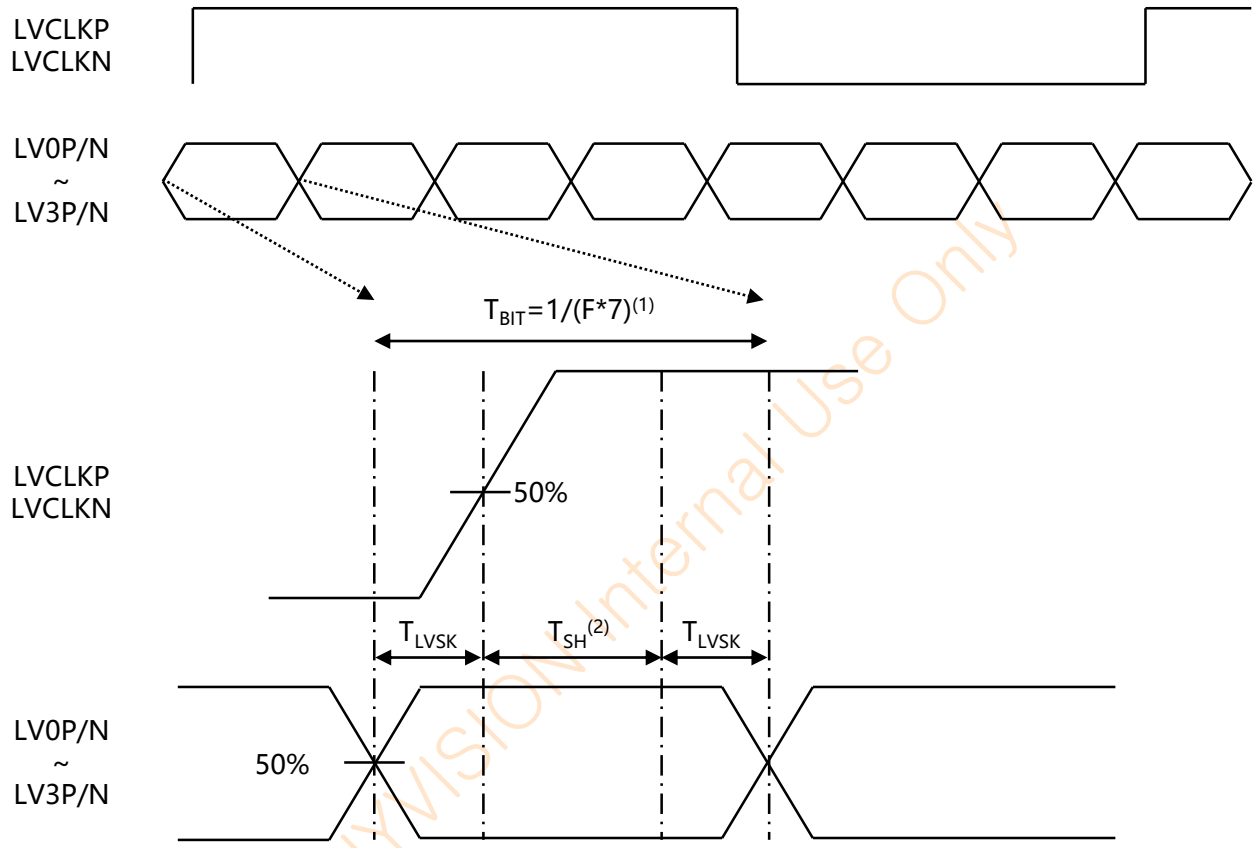
< LVDS V_{ID} and V_{IC} definition>





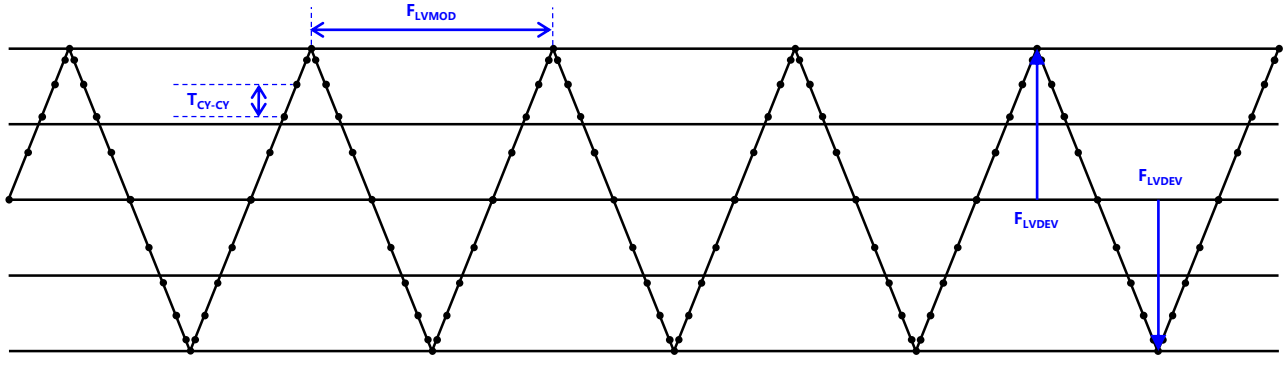
< Mini-LVDS V_{OD} and V_{OS} definition>

3.5.3 AC Specification



Note:
(1) T_{BIT}: Data period
(2) Internal CLK sampling data window

< LVDS channel to channel skew>



< LVDS input SSC>

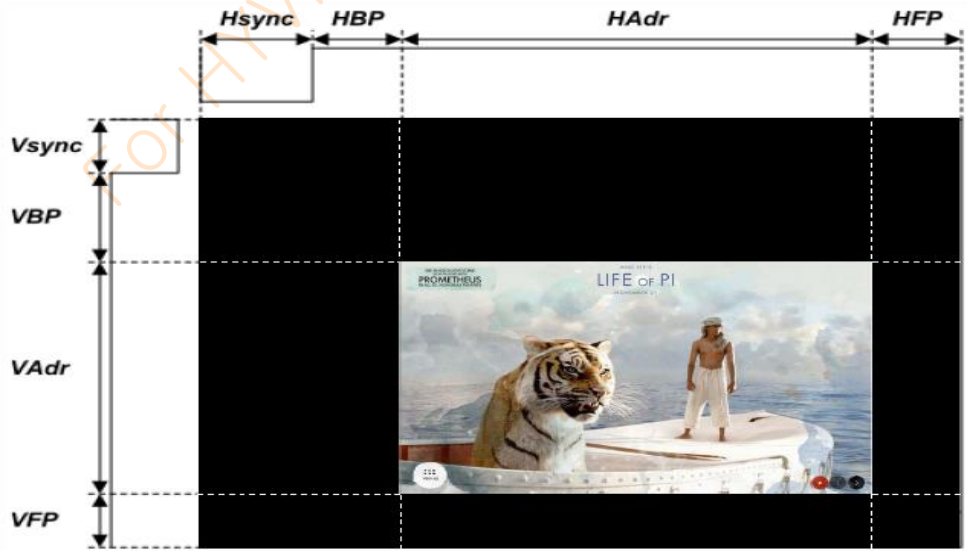
< Table 8. AC Specification >

Description	Symbol	Condition	Min	Typ	Max	Unit
LVDS Input frequency	F	-	68	-	74	MHz
LVDS channel to channel skew	T_{LVSK}	F=65MHz V_{IC}=1.2V V_{ID}=±200mV	-600	-	+600	ps
Modulating frequency of input clock during SSC	F_{LVMOD}	F=85MHz V_{IC}=1.2V V_{ID}=±200mV	10	-	300	KHz
Maximum deviation of input clock frequency during SSC	F_{LVDEV}		-3	-	+3	%
Cycle to cycle jitter	T_{CY-CY}		-	-	200	ps

3.6 Interface timing Parameter

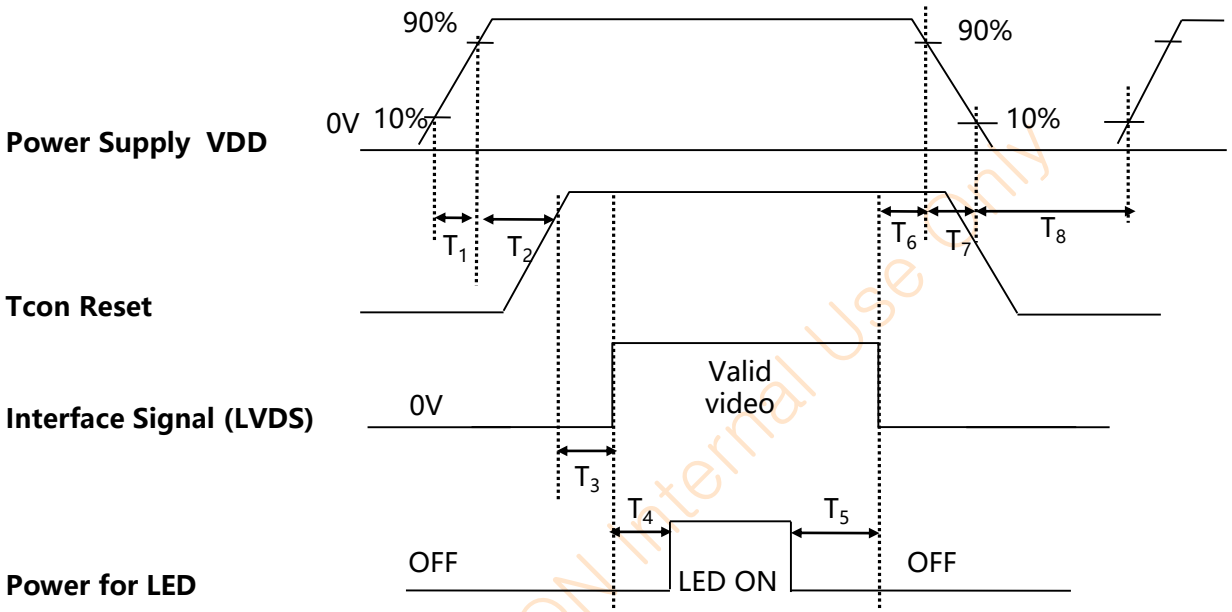
< Table 9. Timing Parameter >

Item			Symbol	min	typ	max	UNIT
LCD	Frame Rate		-	59	60	61	Hz
	Pixels Rate		-	69.922	71	72.293	MHz
Timing	Horizontal	Horizontal total time	tHP	-	1440	-	t_{CLK}
		Horizontal Active time	tHadr		1280		t_{CLK}
		Horizontal Back Porch	tHBP		80		t_{CLK}
		Horizontal Front Porch	tHFP		48		t_{CLK}
	Vertical	Vertical total time	tvp		823		t_H
		Vertical Active time	tVadr		800		t_H
		Vertical Back Porch	tVBP		14		t_H
		Vertical Front Porch	tVFP		3		t_H
Lane				-	1	-	Lane



3.8 Power Sequence

[Ta =25±2 ℃]



< Table 10. Sequence Table >

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.1	-	8	(ms)
T2	-	8	-	(ms)
T3	0	-	-	(ms)
T4	300	-	-	(ms)
T5	300	-	-	(ms)
T6	0	-	50	(ms)
T7	0	-	10	(ms)
T8	500	-	-	(ms)

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.

4.2 Optical Specifications

<Table 11. Optical Specifications >

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Θ3	CR>10	80	85	-	Deg.	Note1
		Θ9		80	85	-	Deg.	
	Vertical	Θ12		80	85	-	Deg.	
		Θ6		80	85	-	Deg.	
Contrast ratio		CR	Θ = 0°	700	900	-		Note2
Transmittance		Tr		4.6	5.4	-	%	Note3
Luminance of White		Yw		340	400		cd/m2	Note 4
White luminance uniformity		ΔY		65	75		%	Note 5
Color Gamut		CG		43	48	-	%	
Reproduction of color	Red	Rx	Θ = 0°	0.566	0.596	0.626		Note6 (Based on BLU)
		Ry		0.323	0.353	0.383		
	Green	Gx		0.305	0.335	0.365		
		Gy		0.529	0.559	0.589		

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
	Blue	Bx	0.123	0.153	0.183		
		By	0.086	0.116	0.146		
White Chromaticity	Wx	Θ = 0°	0.283	0.313	0.343		
	Wy		0.299	0.329	0.359		
Response Time (Rising + Falling)	$T_r + T_f$	Ta= 25° C Θ = 0°				ms	Note 7

Note:

1.Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles 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 (see FIGURE 1).

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 FIGUR 1) Luminance Contrast Ratio (CR) is defined mathematically.

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

3.Transmittance is the Value without APF and without CG.

4.Center Luminance 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 2 for a total of the measurements per display.

5:Luminance measurement

The test condition is at ILED=20mA and measured on the surface of LCD module at 25 ℃.

●The data are measured after LEDs are lighted on for more than 5 minutes and LCM di splays are fully white. The brightness is the average value of 9 measured spots. Measur ement equipment CS2000 or similar equipments(Field of view:1deg,Distance:50cm)

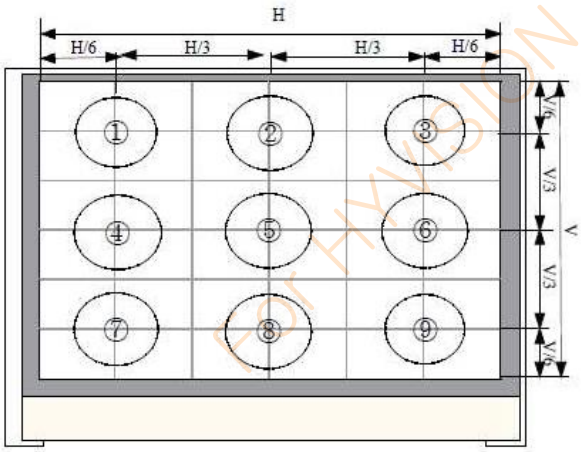
●Measuring surroundings: Dark room.

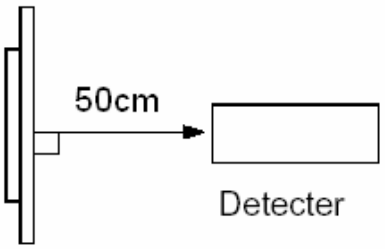
●Measuring temperature: Ta=25℃.

●Adjust operating voltage to get optimum contrast at the center of the display.

●Measured value at the center point of LCD panel must be after more than 5 minutes while backlight turning on.

ΔY = (Minimum Luminance of 9points / Maximum Luminance of 9points) * 100





6.The color chromaticity coordinates specified in the above table 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.

7.The electro-optical response time measurements shall be made as FIGURE 2 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Tf.

Figure1 Measurement Set Up

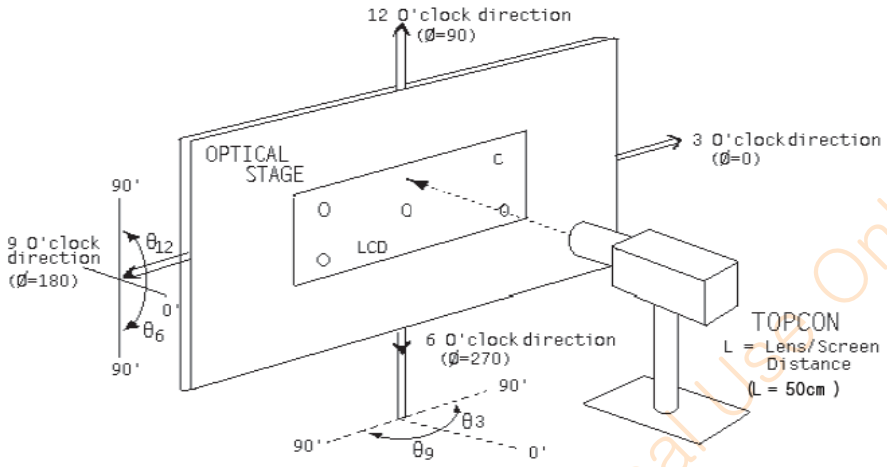
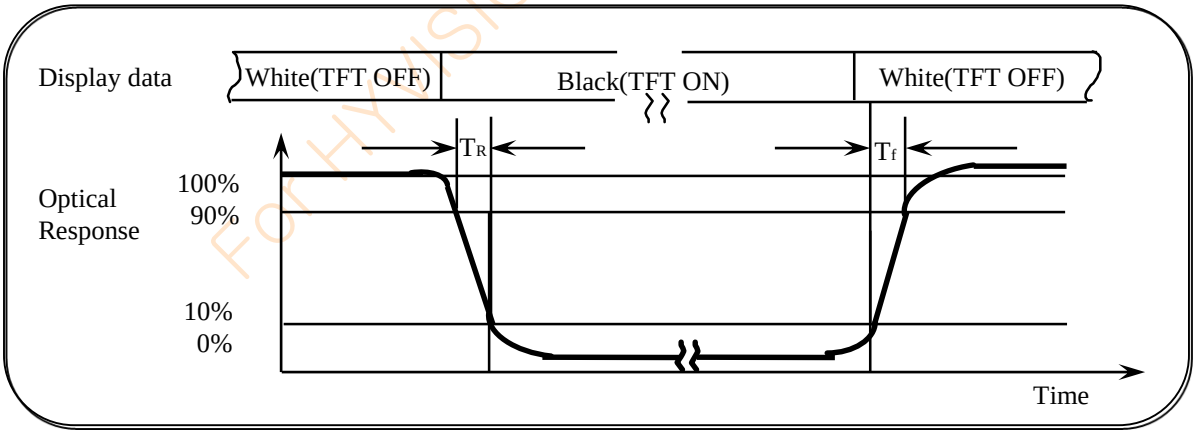


Figure2 Response Time Testing



5.0 RELIABLITY TEST

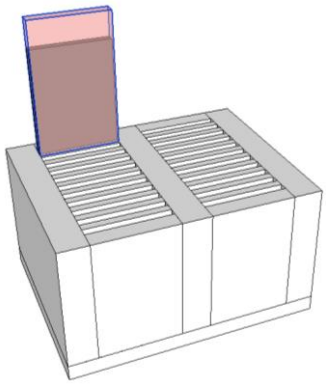
The Reliability test items and its conditions are shown in below.

<Table 12. Reliability Test Parameters >

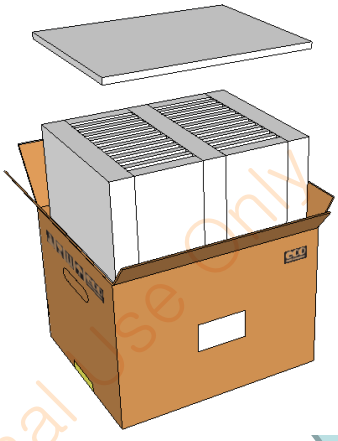
No	Test Items	Conditions
1	High temperature storage test	80℃ 240hr Storage
2	Low temperature storage test	-30℃ 240hr
3	High temperature & high humidity (operation test)	60℃ 90%RH 240hr
4	Low temperature operation test	-20℃ 240hr
5	High temperature operation test	70℃ 240hr
6	Thermal Shock Test	[(-40℃ 30min) →(80℃ 30min)]/cycle, 100cycles
7	8585 Storage	85℃ 85%RH 120hr
8	ESD	Air : +/- 15kV Contact :+/- 8kV
9	Packing VIB	Accleration:1.47Grms 5~100Hz 0.015G*2/Hz /100~200Hz -6dB/Oct / 200Hz 0.0038G*2/Hz / 30 min
10	Packing Drop	6 surfaces / 3edges / 1corner/ for Box Test

6.0 PACKING INFORMATION(产品形态：)

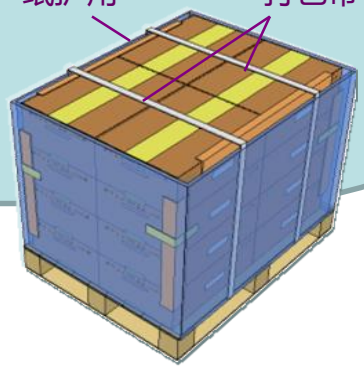
Packing procedure:



-. 将1片产品竖向放入PE Bag
PE Bag开口反折
-. 将产品竖向插入卡槽内(1卡槽1片产品)
-. 22pcs 产品/白色EPE Box



-. 将EPE Bottom 放入纸箱后
再放置EPE Cover
-. 22pcs 产品/纸箱



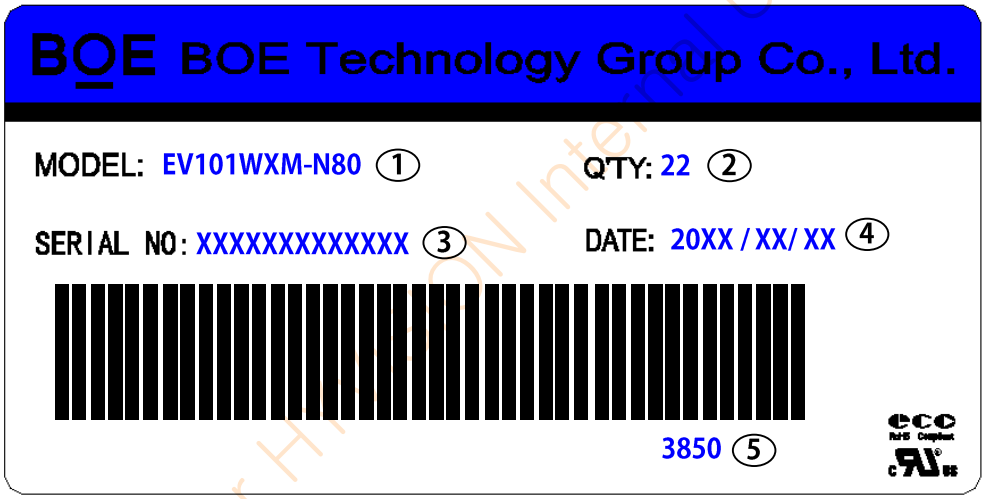
-. 每个Pallet上放3层Box
1层4箱,共计12ea Box
-. Pallet外进行缠膜包装
-. 264pcs Panel / Pallet

6.1 Packing Note(产品形态：LCM)

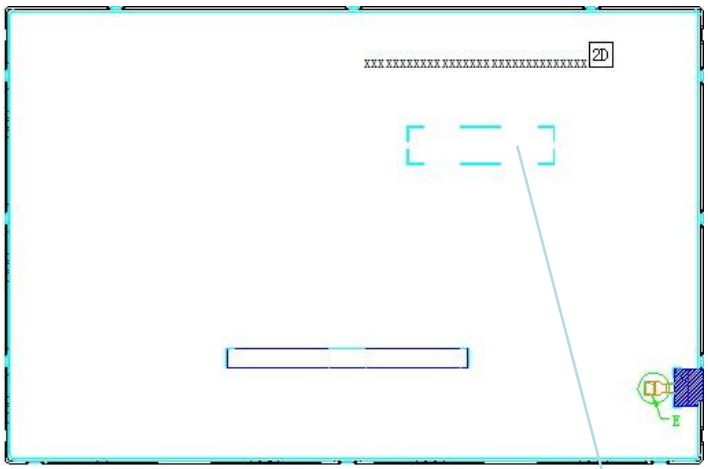
- Box Dimension: 500mm(W) x 400mm(D) x 290mm(H)
- Package Quantity in one Box: 22pcs

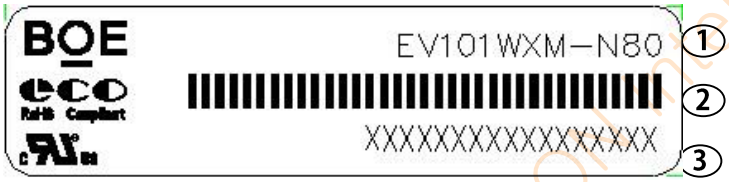
6.2 Box label (产品形态:)

- Label Size :115mm*55mm
- Contents
  Model : LCM
  Q`ty : 22pcs/Box
  Serial No. : Box Serial No. as shown below.
  Date : Packing Date
  FG Code : FG Code of Product



7.0 Product Label





Label size: 48mm × 12mm × 0.08mm

1. **FG-CODE: EV101WXM-N80**
2. **MDL ID bar code**
3. **MDL ID**

BOE MDL ID Rule

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码	X	X	X	3	X	X	X	3	8	5	0	X	X	X	X	X	X
描述	GBN代码		等级	B3	年	月	日	FG Code后四位				序列号					

8.0 Handling & Cautions

8.1 Mounting Method

- The panel of the LCD consists of two thin glasses with polarizers which easily get damaged. So extreme care should be taken when handling the LCD.
- Excessive stress or pressure on the glass of the LCD should be avoided. Care must be taken to insure that no torsional or compressive forces are applied to the LCD unit when it is mounted.
- If the customer's set presses the main parts of the LCD, the LCD may show the abnormal display. But this phenomenon does not mean the malfunction of the LCD and should be pressed by the way of mutual agreement.
- To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- Mount a LCD module with the specified mounting parts.

8.2 Caution of LCD Handling and Cleaning

- Since the LCD is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration,and careless handling may seriously affect the product. If it falls from a high place or receives a strong shock, the glass may be broken.
- The polarizers on the surface of panel are made from organic substances. Be very careful for chemicals not to touch the polarizers or it leads the polarizers to be deteriorated.
- If the use of a chemical is unavoidable, use soft cloth with solvent （recommended below） to clean the LCD ‘s surface with wipe lightly.
  -IPA(Isopropyl Alcohol), Ethyl Alcohol, Trichlorotriflorothane
- Do not wipe the LCD's surface with dry or hard materials that will damage the polarizers and others. Do not use the following solvent.
  -Water, Ketone, Aromatics
- It is recommended that the LCD be handled with soft gloves during assembly, etc. The polarizers on the LCD's surface are vulnerable to scratch and thus to be damaged by sharp particles.
- Do not drop water or any chemicals onto the LCD's surface.
- A protective film is supplied on the LCD and should be left in place until the LCD is required for operation.
- The ITO pad area needs special careful caution because it could be easily corroded. Do not contact the ITO pad area with HCFC,Soldering flux,Chlorine,Sulfur,saliva or fingerprint. To prevent the ITO corrosion, customers are recommended that the ITO area would be covered by UV or silicon.

8.3 Caution Against Static Charge

- The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.
- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- In handling the LCD, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

8.4 Caution For operation

- It is indispensable to drive the LCD within the specified voltage limit since the higher Voltage than the limit causes the shorter LCD's life. An electro-chemical reaction due to DC causes undesirable deterioration of the LCD so that the use of DC drive should avoid.
- Do not connect or disconnect the LCD to or from the system when power is on.
- Never use the LCD under abnormal conditions of high temperature and high humidity.
- When expose to drastic fluctuation of temperature (hot to cold or cold to hot) ,the LCD may be affected; Specifically, drastic temperature fluctuation from cold to hot ,produces dew on the LCD's surface which may affect the operation of the polarizer and the LCD.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD may turn black at temperature above its operational range. However those phenomena do not mean malfunction or out of order with the LCD. The LCD will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.
- Do not display the fixed pattern for a long time because it may develop image sticking due to the LCD structure. If the screen is displayed with fixed pattern, use a screen saver.

8.5 Packaging

- Modules use LCD element, and must be treated as such.
  -Avoid intense shock and falls from a height.
  -To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity for long periods.

8.6 Storage

- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Relative humidity of the environment should therefore be kept below 60%RH.
- Original protective film should be used on LCD’ s surface (polarizer). Adhesive type protective film should be avoided, because it may change color and/or properties of the polarizers.
- Do not store the LCD near organic solvents or corrosive gasses.
- Keep the LCD safe from vibration, shock and pressure.
- Black or white air-bubbles may be produced if the LCD is stored for long time in the lower temperature or mechanical shocks are applied onto the LCD.
- In the case of storing for a long period of time for the purpose or replacement use, the following ways are recommended.
  -Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.
  -Store in a dark place where neither exposure to direct sunlight nor light is.
  -Keep temperature in the specified storage temperature range.
  -Store with no touch on polarizer surface by the anything else. If possible, store the LCD in the packaging situation LCD when it was delivered.

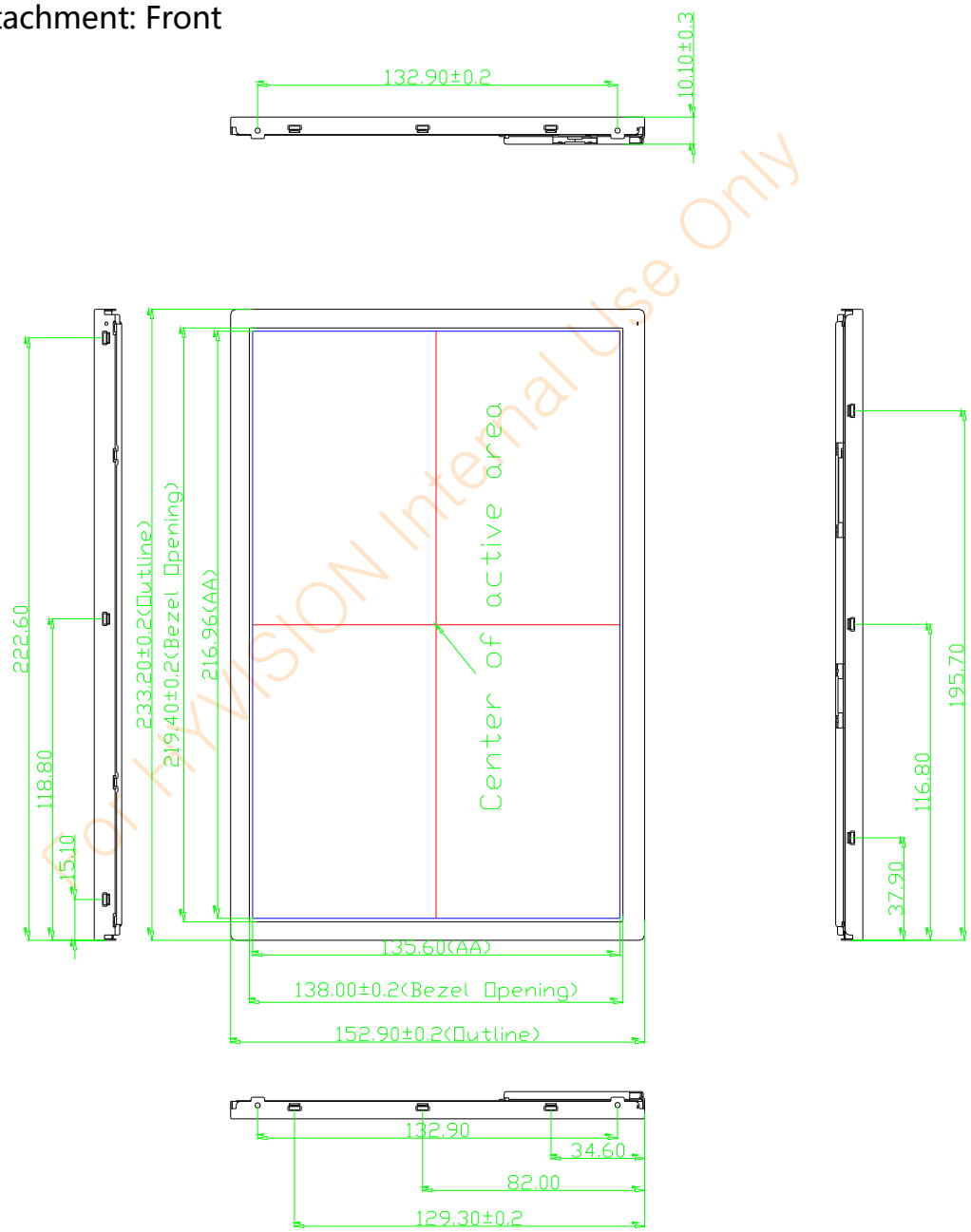
8.7 Safety

- For the crash damaged or unnecessary LCD, it is recommended to wash off liquid crystal by either of solvents such as acetone and ethanol an should be burned up later.
- In the case the LCD is broken, watch out whether liquid crystal leaks out or not. If your hands touch the liquid crystal, wash your hands cleanly with water an soap as soon as possible.
- If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then drink a lot of water and induce vomiting, and then, consult a physician.
- If the liquid crystal should get in your eyes, flush your eyes with running water for at least fifteen minutes.
- If the liquid crystal touches your skin or clothes, remove it and wash the affected part of your skin or clothes with soap and running water.

9.0 APPENDIX

Mechanical Drawing

Drawing Attachment: Front



Mechanical Drawing

Drawing Attachment: Back