Specification
For
Approval

■ Preliminary specification
□Final specification

Title	20.1UXGA ADS TFT-LCD (MDL)

Buyer	
Model	TAD201-001

Supplier	BOE Special Display Technology Co.,Ltd
Model	

TITLE/SIGNATURE	DATE	ITEM	SIGNATURE/DATE
		Approved	
		Reviewed	
		Reviewed	
		Prepared	

Please return one copy confirmation with signature and your comments

BOE Special Display Technology Co., Ltd

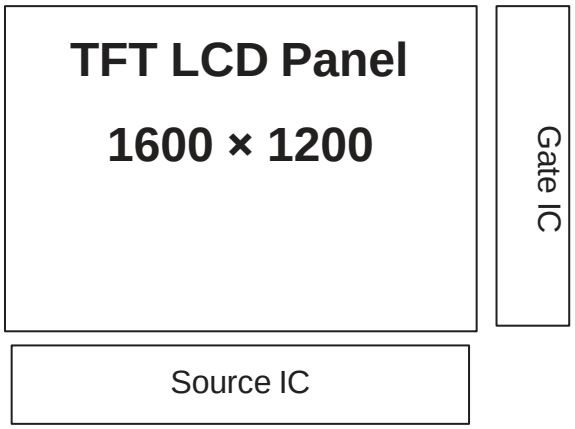
CONTENT LIST

Record of Revisions				
Revision	Date	Page	Description	Released by
Pre.1	2014.12.20		Initial Released	Wang Zhicheng

1. GENERAL DESCRIPTION

2. Introduction

20.1UXGA is a color active matrix TFT-LCD model using amorphous silicon TFT's(Thin Film Transistors) as an active switching devices. This model is composed of a TFT-LCD Panel, a driving circuit and a back light system. It is a transmissive type display operating in the normal black. This TFT-LCD has a 20.1 inch diagonally measured active area with UXGA resolutions (1600 horizontal by 1200 vertical pixel array). Each pixel is divided into Red, Green, Blue dots which are arranged in 2 domain stripe and this panel can display 16.7M colors.



1.2 Features

UXGA 1600(H) x 1200(V) resolution

LVDS Interface

ADS Tech, wide viewing angle

8-bit color depth, display 16. 7M colors

High luminance and contrast ratio

Wide operating temperature

1.3 Application

TFT-LCD Monitor

Application

1.4 General Specifications (H: horizontal length, V: vertical length)

1.4.1 Physical Specifications

Parameter	Specification	Unit	Remark
Active Area	408(H) × 306(V)	mm	
Number of Pixels	1600(H) RGB × 1200(V)	pixels	
Pixel Pitch	255(H) × 255(V)	um	
Pixel Arrangement	RGB 2 domain stripe		
Display Colors	16.7 M(8-bits)	colors	
Color Gamut	72%(typ.)		
Display Mode	Normally Black, Transmissive mode		
Dimensional Outline	432±0.5(H)×331.5±0.5(V)×19.5±0.5(D)	mm	Module
Polarizer Surface treatment	25% Haze		
Viewing Direction(Human Eye)	U/D/L/R free viewing direction		Note 1
Weight	2.45	Kg	

Note:

1.At the U/D/L/R direction, the viewing angle is same

2.The TFT and CF Rubbing Direction

1. ELECTRICAL SPECIFICATION

2. Absolute Maximum Ratings

The absolute maximum ratings are list on table as follows. When used out of the absolute maximum ratings, the LSI may be permanently damaged. Using the LSI within the following electrical characteristics limit is strongly recommended for normal operation. If these electrical characteristic conditions are exceeded during normal operation, the LSI will malfunction and cause poor reliability.

2.1 Backlight Driving Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Remark
LED Forward Voltage	V_F	2.9		3.6	V	-
LED Forward Current	I_F		120		mA	-
LED Power Consumption	P_{LED}	17.4		21.6	W	Note 1
LED Life-Time	N/A	30000			Hrs	IF = 120mA Note 2

Notes:

1. Calculator Value for reference $I_{LED} \times V_{LED} \times$ LED Quantity = P_{LED}
2. The LED Life-time define as the estimated time to 50% degradation of initial luminous.

Figure 1 Top View of LED Bar Connector

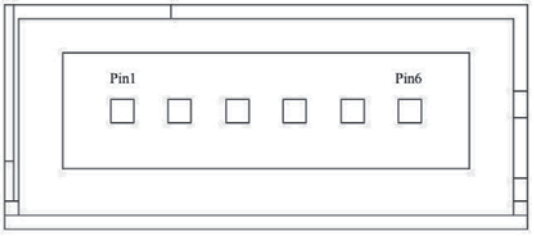
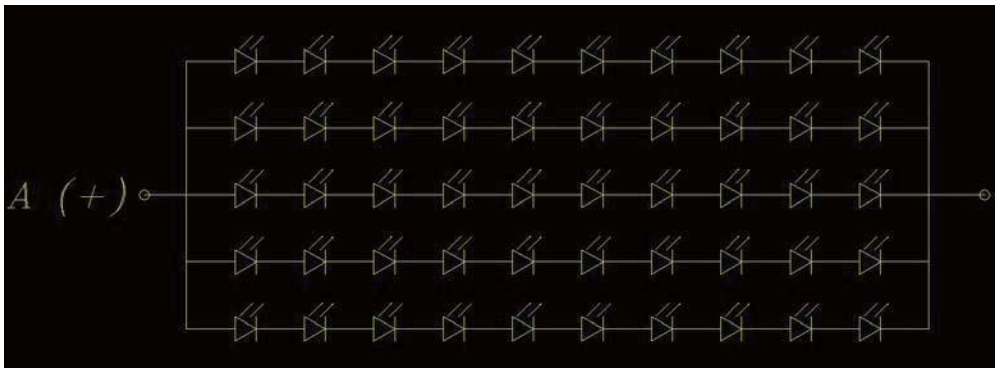


Table 1 LED Light Bar

Pin No	Symbol	Description
1	VLED	LED power supply
2	IRLED1	LED current sense for string1
3	IRLED2	LED current sense for string2
4	IRLED3	LED current sense for string3
5	IRLED4	LED current sense for string4
6	IRLED5	LED current sense for string5

Figure 2 LED Circuit Diagram



2.2 Power Consumption

Parameter	Symbol	Typ	Unit	Remark
TFT driver board	Vcc Input 12V	4.8	W	Note

Note:

Frame rate=60HZ, Color bar pattern, 25**Š**

3.0 INTERFACE CONNECTION

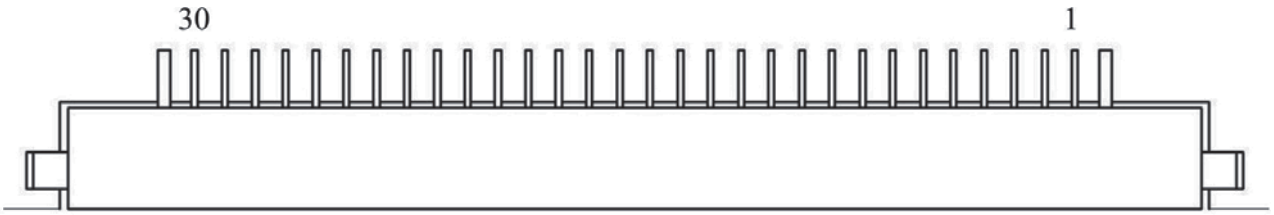


Figure 1. The definition of LVDS Connection

Pin No.	Symbol	Functions	Pin No.	Symbol	Functions
1	VCC	+12V power supply	16	RBIN0-	LVDS EVEN Data0-
2	VCC	+12V power supply	17	VSS	GND
3	VCC	+12V power supply	18	VSS	GND
4	VCC	+12V power supply	19	RAIN3+	LVDS ODD Data3+
5	VSS	GND	20	RAIN3-	LVDS ODD Data3-
6	VSS	GND	21	CKAIN+	LVDS ODD Clock+
7	RBIN3+	LVDS EVEN Data3+	22	CKAIN-	LVDS ODD Clock-
8	RBIN3-	LVDS EVEN Data3-	23	RAIN2+	LVDS ODD Data2+
9	CKBIN+	LVDS EVEN Clock+	24	RAIN2-	LVDS ODD Data2-
10	CKBIN-	LVDS EVEN Clock-	25	RAIN1+	LVDS ODD Data1+
11	RBIN2+	LVDS EVEN Data2+	26	RAIN1-	LVDS ODD Data1-
12	RBIN2-	LVDS EVEN Data2-	27	RAIN0+	LVDS ODD Data0+
13	RBIN1+	LVDS EVEN Data1+	28	RAIN0-	LVDS ODD Data0-
14	RBIN1-	LVDS EVEN Data1-	29	VSS	GND
15	RBIN0+	LVDS EVEN Data0+	30	NC	No connection

Note:

1. Interface Connector: 30 pin LVDS connector F76LARW-30S-1H (HIROSE) or FI-XB30SRL-HF11 (JAE)
2. 12V input power supply

1. OPTICAL SPECIFICATIONS

2. Overview

The test of Optical specifications shall be measured in a dark room(ambient luminanceŠ 1 lux and temperature = 25±2?) with the equipment of Luminance meter system (Topcon SR-UL1R and Westar TRD-100A) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of 0 and 0 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.

2. Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Threshold Voltage		Vsat		4.1	4.3	4.5	V	Fig.1
		Vth		1.6	1.8	2.0	V	
Viewing Angle	Horizontal	©3	CR>10		89		°	Note 1
		©9			89		°	
	Vertical	©12			89		°	
		©6			89		°	
Contrast Ratio		CR	©= 0°	600	800			Note 2
Luminance		Yw	©= 0°	380	450		cd/m^2	Note 3
Uniformity		%	©= 0°	75	80			Note 4
Color Gamut		%	©= 0°	65	70			
Reproduction Of color	Red	Rx	©= 0°	0.641	0.656	0.671		Note 4 * CF glass
		Ry		0.312	0.327	0.342		
	Green	Gx		0.273	0.288	0.303		
		Gy		0.575	0.590	0.605		
	Blue	Bx		0.123	0.138	0.153		
		By		0.096	0.111	0.126		
White		Wx	©= 0°	0.272	0.302	0.332		
		Wy		0.299	0.329	0.359		
Response Time		Tr+Tf	©= 0°		25	30	ms	Note 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 (See FIG.1).

2.Contrast measurements shall be made at viewing angle of ©= 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 FIG. 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.Surface luminance is the center point across the LCD surface 50cm from the surface with all pixels displaying white. This measurement shall be taken at the locations shown in FIG. 2.

4.Uniformity measurement shall be taken at the locations shown in FIG. 2&3, for a total of the measurements per display, measure surface luminance of these nine points across the LCD surface 50cm from the surface with all pixels displaying white.

$$\text{Uniformity} = \frac{\text{Min Luminance of 9 points}}{\text{Max Luminance of 9 points}} \times 100\%$$

5.The color chromaticity coordinates specified in Table1 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 Module.

6.The electro-optical response time measurements shall be made as FIG.4 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.

Figure 1. The definition of Vth & Vsat

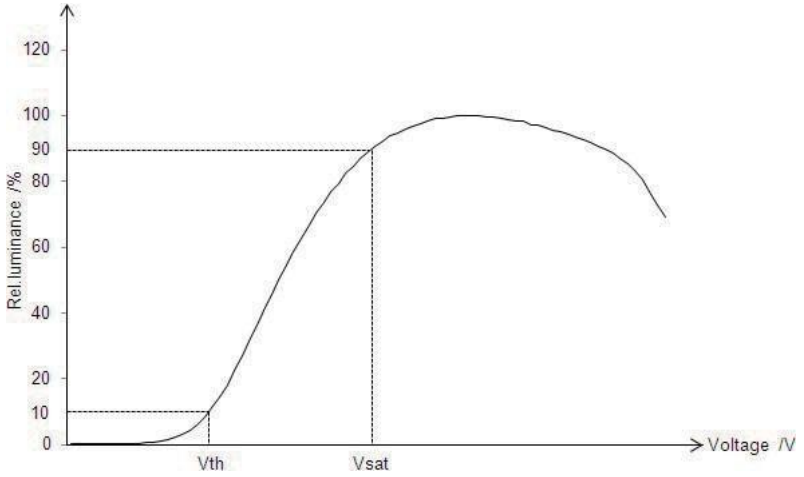


Figure 2. Measurement Set Up

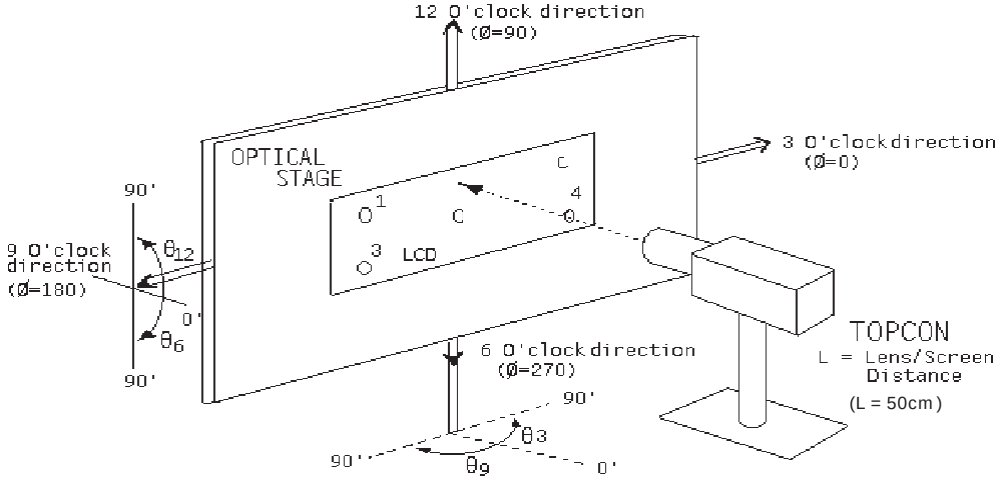


Figure 3. Uniformity Measurement Locations

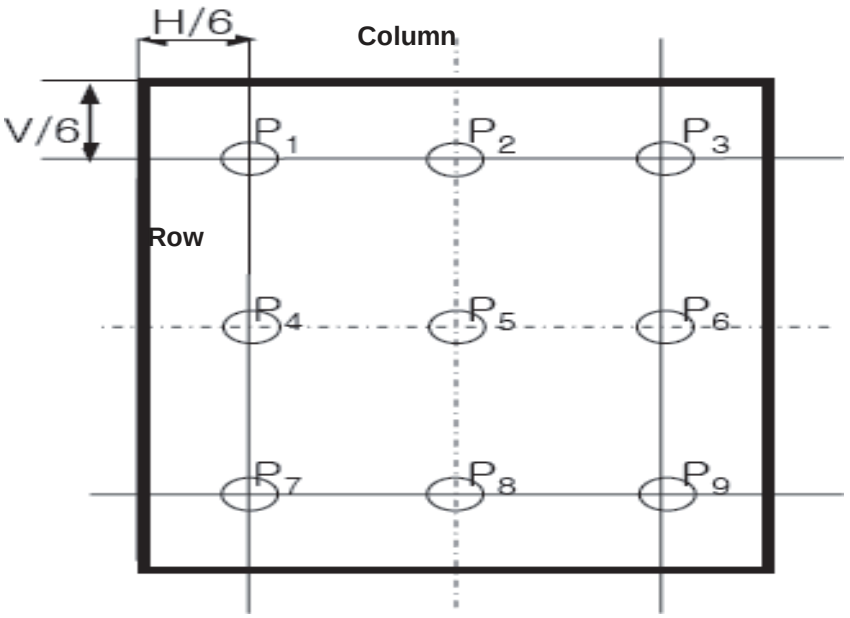
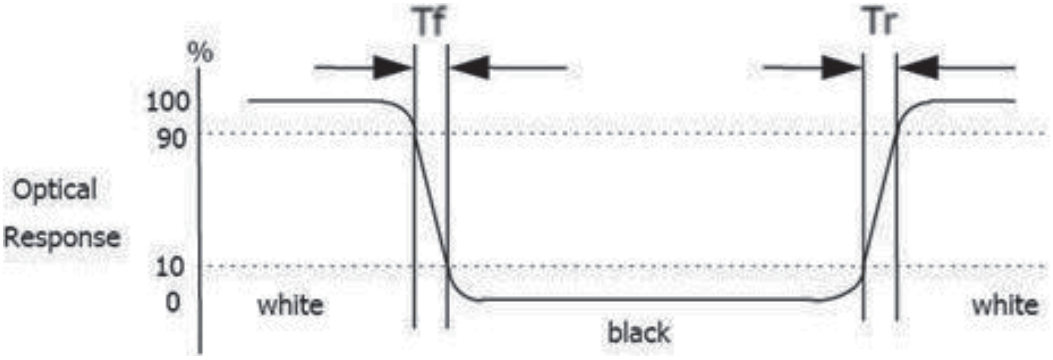


Figure 4. Response Time Testing

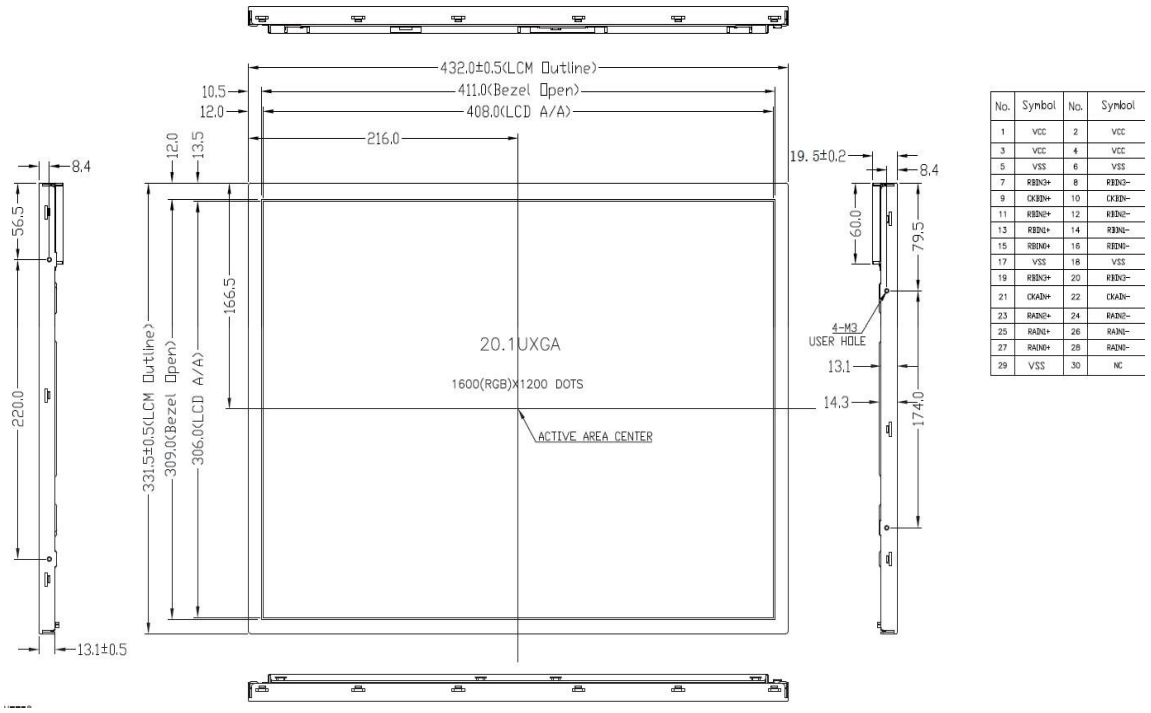


1. MECHANICAL CHARACTERISTICS

2. Dimension Requirements

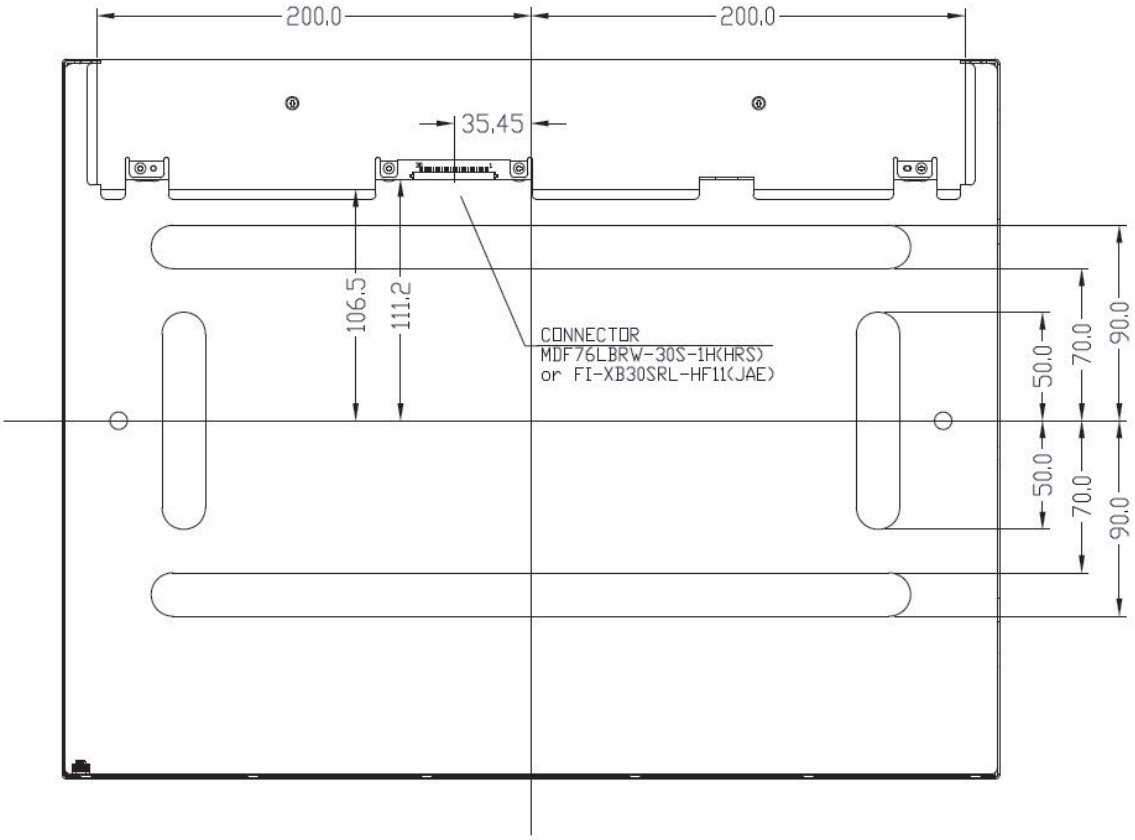
Parameter	Specification	Unit	Remark
Active Area	408(H) × 306(V)	mm	
Dimensional outline	432±0.5(H)×331.5±0.5(V)×25±0.2(D)	mm	

Figure 5. LCM Outline Dimension (front view unit:mm)



No.	Symbol	No.	Symbol
1	VCC	2	VCC
3	VCC	4	VCC
5	VSS	6	VSS
7	RBIN3+	8	RBIN3-
9	CKBIN+	10	CKBIN-
11	RBIN2+	12	RBIN2-
13	RBIN1+	14	RBIN1-
15	RBIN0+	16	RBIN0-
17	VSS	18	VSS
19	RBIN3+	20	RBIN3-
21	CKAIN+	22	CKAIN-
23	RAIN2+	24	RAIN2-
25	RAIN1+	26	RAIN1-
27	RAIN0+	28	RAIN0-
29	VSS	30	NC

Figure 6. Moudule Outline Dimension (rear view unit:mm)

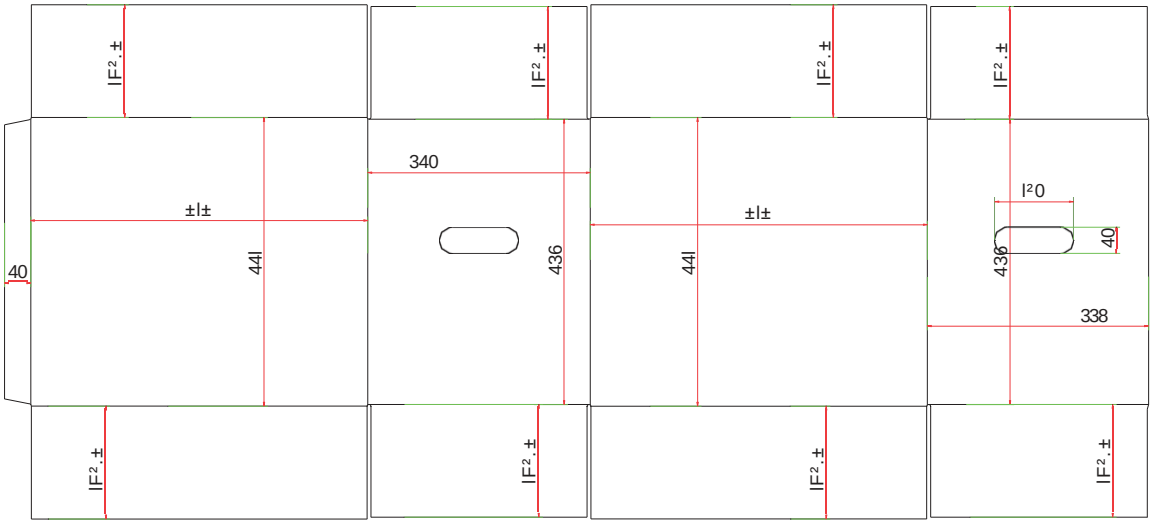


6.0 RELIABILITY TEST

Item		Test condition
High temperature storage		85 ?, 48hrs
Low temperature storage		-55 ?, 24 hrs
High temperature & high humidity operation		60 ?, 80%RH, 240hrs
High temperature operation		80 ?, 2hrs
Low temperature operation		-30?, 2hrs
Thermal shock		-30 ? — 80 ? (0.5 hr), 100 cycle
Vibration test	Frequency	10/ 500/10 Hz,Sine X/Y/Z Direction
	Gravity / AMP	1.5 G
	Period	±X, ±Y, ±Z 30 min
Shock test	Gravity	50G
	Pulse width	11msec, sine wave
	Direction	±X, ±Y, ±Z
On/Off test		On/10 sec, Off/10 sec, 30,000 cycles
ESD	Air	4KV,150pF(330**K**) 1sec, 8 points, 25 times/ point
	Contact	2KV, 150pF(330**K**) 1sec, 8 points, 25 times/ point

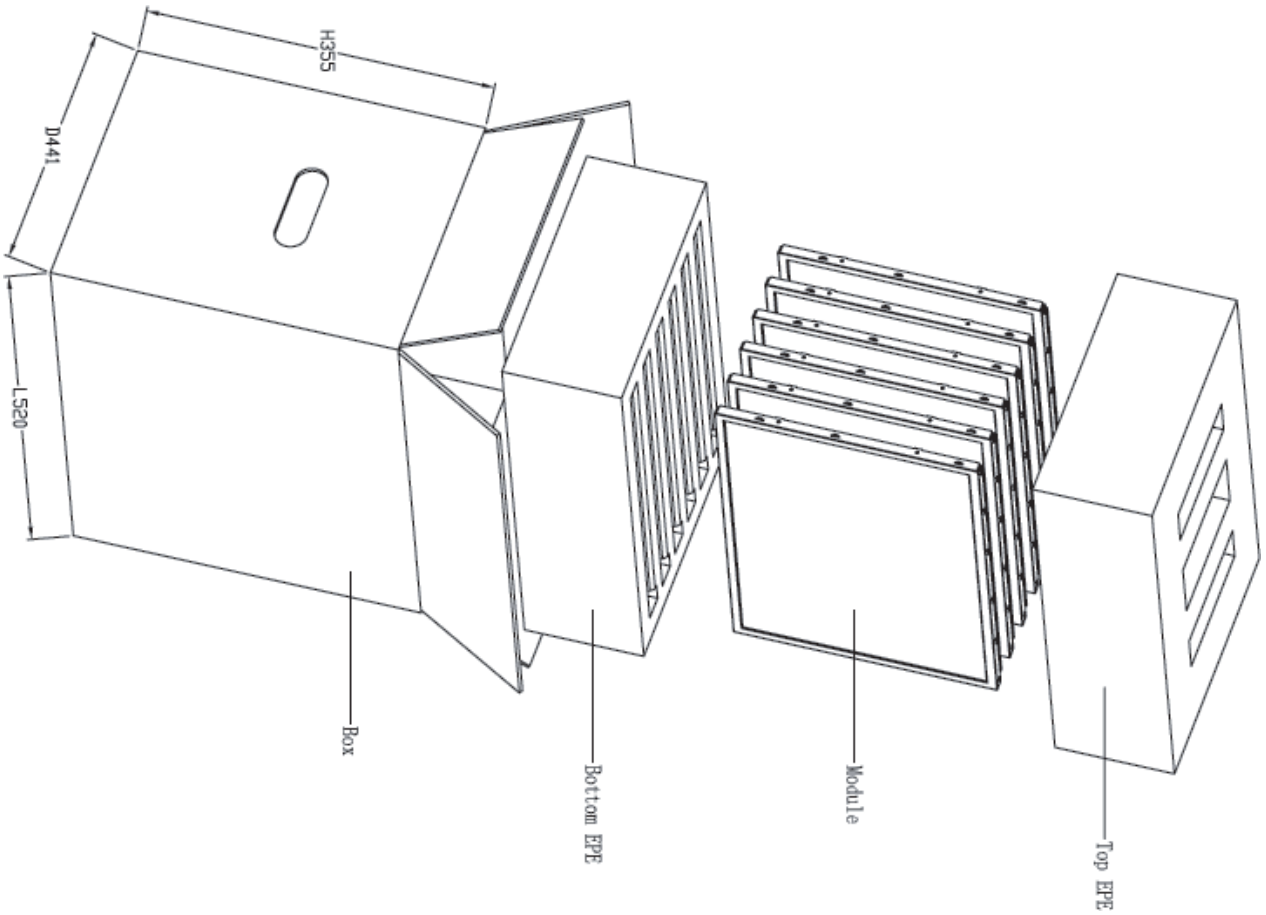
1. PACKING METHOD

2. Box drawing



fi#flfl: L*W*H 510*431*335

7.2 Packing process



1. HANDDLING & CAUTIONS

2. Mounting Method

•The panel of the LCM consists of two thin glasses with polarizer which easily get damaged. So extreme care should be taken when handling the LCM.

•Excessive stress or pressure on the glass of the LCM should be avoided. Care must be taken to insure that no torsional or compressive forces are applied to the LCM unit when it is mounted.

•If the customer's set presses the main parts of the LCM, the LCM may show the abnormal display. But this phenomenon does not mean the malfunction of the LCM 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 LCM with the specified mounting parts.

8.2 Caution of LCM Handling and Cleaning

•Since the LCM 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 maybe broken.

•The polarizer on the surface of panel are made from organic substances. Be very careful for chemicals not to touch the polarizer or it leads the polarizer to be deteriorated.

•If the use of a chemical is unavoidable, use soft cloth with solvent recommended below to clean the LCM's surface with wipe lightly.

-IPA (Isopropyl Alcohol), Ethyl Alcohol, Tri-chloro, tri-florothane.

•Do not wipe the LCM's surface with dry or hard materials that will damage the polarizer and others. Do not use the following solvent—Water, acetone, Aromatics.

•It is recommended that the LCM be handled with soft gloves during assembly, etc. The polarizer on the LCM's surface are vulnerable to scratch and thus to be damaged by shape particles.

•Do not drop water or any chemicals onto the LCM's surface.

•A protective film is supplied on the LCM and should be left in place until the LCM is required for operation.

•TheITO 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 from the ITO corrosion, customers are recommended that the ITO area would be covered by UV or silicon.

• Please clean the LCD without ultrasonic to avoid line open.

8.3 Caution Against Static Charge

•The LCM 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 LCM, 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 LCM within the specified voltage limit since the higher voltage than the limit causes LCM's life shorter. An electro-chemical reaction due to DC causes undesirable deterioration of the LCM so that the use of DC drive should avoid.

- Do not connect or disconnect the LCM to or from the system when power is on.
- Never use the LCM under abnormal conditions of high temperature and high humidity.

•When expose to drastic fluctuation of temperature(hot to cold or cold to hot), the LCM may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCM's surface which may affect the operation of the polarizer on the LCM.

- Response time will be extremely delay at lower temperature than the operating temperature range and on the other hand LCM may turn black at temperature above its operational range. However those phenomenon do not mean malfunction or out of order with the LCM. The LCM 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 LCM structure. If the screen is displayed with fixed pattern, use a screen saver.

- Do not disassemble and/or re-assemble LCM module

8.5 Packaging

- Modules use LCM 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 LCM's surface (polarizer). Adhesive type protective film should be avoided, because it may change color and/or properties of the polarizer.

•Do not store the LCM near organic solvents or corrosive gasses.

•Keep the LCM safe from vibration, shock and pressure.

•Black or white air-bubbles may be produced if the LCM is stored for long time in the lower temperature or mechanical shocks are applied onto the LCM.

• 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 LCM in the packaging situation when it was delivered.

8.7 Safety

•For the crash damaged or unnecessary LCM, 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 of LCM is broken, watch out whether liquid crystal leaks out or not. If your hands touch the liquid crystal, wash your hands cleanly with water and 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 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 Applicable Scope

•This product specification only applies to the products manufactured and sold by our company.

•Any specification, quality etc. about other parts mentioned in this product spec are no concern of our company.