AT070WSB-NW1-3800(3G00)

Product Specification Rev. P0

HEFEI BOE OPTOELECTRONICS TECHNOLOGY

REVISION HISTORY

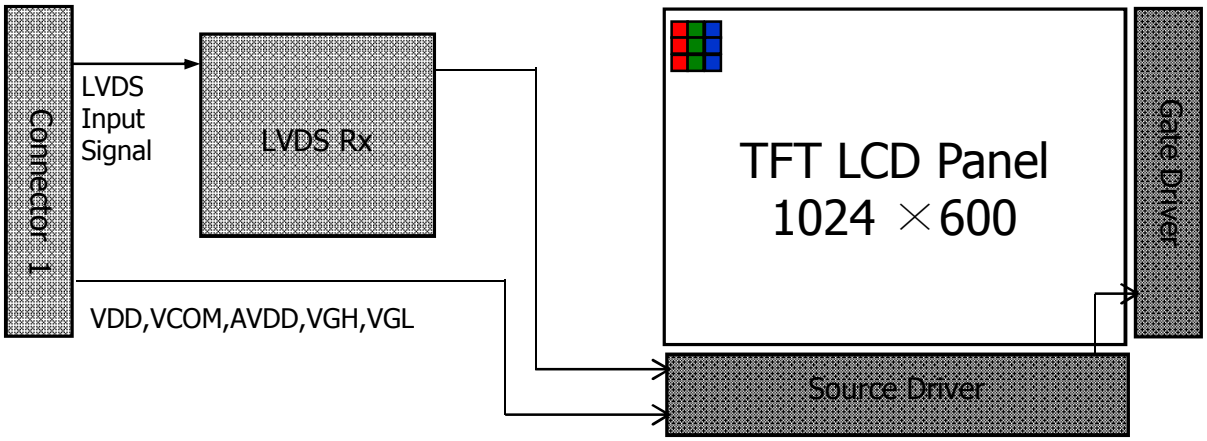
REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0		Initial Release	2015.02.28	杨怀伟

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

AT070WSB-NW1-3800(3G00) is a color active matrix TFT LCD single cell using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This pane l has a 7 inch diagonally measured active area with WSVGA resolutions (1024 horizontal by 600 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors.



1.2 Features

- 0.5 t Glass
- IC(FOG) 1+1

1.3 Application

- Vehicle Device

1.4 General Specification

The followings are general specifications at the single cell.

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	154.2144(H) ×85.92(V)	mm	
CF size	159(H) ×91(V)	mm	
Number of pixels	1024 (H) ×600 (V)	pixels	
Pixel pitch	0.0502(H) × 0.1432(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.7M	colors	
Color Gamut	50	%	
Display mode	Normally White		
Panel Size	162.2 (H) x 95.7 (V)	mm	

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
Digital Power Supply	V_{DD}	-0.3	4.1	V	Ta=25+/-2°C
Operating Temperature (Humidity)	T_{OP}	-20	+70	℃	
	RH		90	%	At 60°C
Storage Temperature (Humidity)	T_{ST}	-30	+80	℃	
	RH		90	%	At 60°C

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

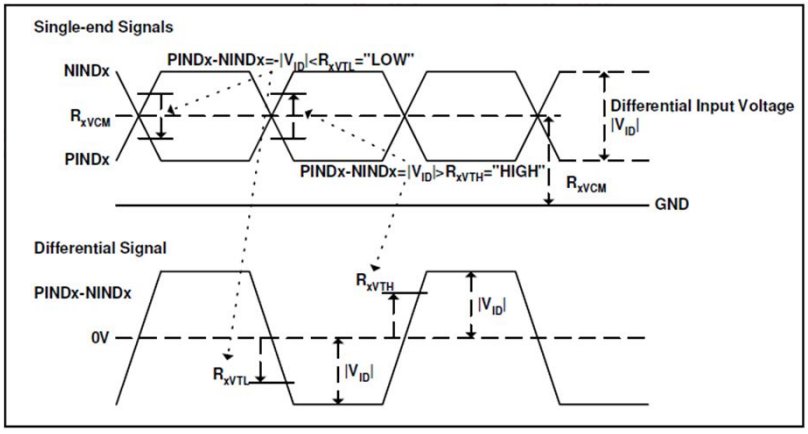
3.0 ELECTRICAL SPECIFICATIONS

3.1Electrical Specifications

< Table 3. Electrical specifications >

[Ta =25±2 ℃]

Parameter		Symbol	Values			Unit	Notes
			Min	Typ	Max		
Power Supply Input Voltage		VDD	3	3.3	3.6	Vdc	
Power Supply Ripple Voltage		VRP			300	mV	
Power Consumption		PDD		0.21	0.25	Watt	1,2
Rush current		IRUSH	-	-	1	A	
LVDS Interface	Differential Input High Threshold Voltage	VLVTH	100		300	mV	
	Differential Input Low Threshold Voltage	VLVTL	-300		-100	mV	
	Common Input Voltage	VLVC	|Vid|/2	1.2	VDD-1.2	V	
	Differential input voltage	|Vid|	0.2	-	0.6		
CMOS Interface	Input High Threshold Voltage	VIH	2.6	-	3.3	V	
	Input Low Threshold Voltage	VIL	0	-	0.8	V	



Notes:

1. The specified current and power consumption are under the conditions at VDD =3.3V, T = 25°C, and fv = 60 Hz, at check flag pattern (TYP)
2. The specified current and power consumption are under the conditions at VDD = 3.3V, T = 25°C, and fv = 60 Hz, at black pattern (MAX)

3.0 ELECTRICAL SPECIFICATIONS

3.2Electrical Specifications

< Table 4.Panel Electrical specifications >

[Ta =25±2 ℃]

Parameter	Symbol	Value			Unit	Remarks
		MIN	Typ	MAX		
Digital Voltage	VDD	3.0	3.3	3.6	V	
Analog Voltage	AVDD	9.4	9.6	9.8	V	
TFT Gate ON Voltage	VGH	17	18	20	V	VGH-VGL<=40V
TFT Gate OFF Voltage	VGL	-5	-6	-7	V	
TFT Common Electrode Voltage	VCOML	3	3.5	4	V	

Notes :
1. VGH is TFT Gate operating voltage.
2. VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuates with same phase as Vcom.
3. Vcom must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc..
4. The value is just the reference value. The customer can optimize the setting value by the different D-IC.

3.0 ELECTRICAL SPECIFICATIONS

3.3 LCD INTERFACE CONNECTIONS

FPC Connector is used for the module electronics interface . The recommended model is FH12A-40S-0.5SH

< Table 5.Panel Electrical specifications >

Pin No.	Symbol	I/O	Description	Remark
1	VCOM	P	Common voltage	
2	DVDD	P	Power Supply, 3.3V	
3	DVDD	P	Power Supply, 3.3V	
4	NC	-	NC	
5	Reset	I	Global reset pin	Note 2
6	STBYB	I	Stand by mode , Normally pulled high	Note 3
7	GND	P	Ground	
8	RXIN0-	I	-LVDS Differential Data input	
9	RXIN0+	I	+LVDS Differential Data input	
10	GND	P	Ground	
11	RXIN1-	I	-LVDS Differential Data input	
12	RXIN1+	I	+LVDS Differential Data input	
13	GND	P	Ground	
14	RXIN2-	I	-LVDS Differential Data input	
15	RXIN2+	I	+LVDS Differential Data input	
16	GND	P	Ground	
17	CLKIN-	I	-LVDS Differential CLK input	
18	CLKIN+	I	+LVDS Differential CLK input	
19	GND	P	Ground	
20	RXIN3-	I	-LVDS Differential Data input	
21	RXIN3+	I	+LVDS Differential Data input	
22	GND	P	Ground	
23	NC	-	NC	
24	NC	-	NC	
25	GND	P	Ground	
26	NC	-	NC	
27	DIMO	O	Backlight CABC controller signal output	Note 4
28	SELB	I	6bit/8bit mode select	Note 5
29	AVDD	P	Power for analog circuit	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	SHLR	I	Horizontal inversion	Note 6
34	UPDN	I	Vertical inversion	
35	VGL	P	Negative power for TFT	
36	CABCEN1	I	CABC H/W enable	Note 7
37	CABCEN0	I	CABC H/W enable	
38	VGH	P	Positive power for TFT	
39	LED+	P	LED Anode	
40	LED+	P	LED Anode	

Note.1

I/O definition : I---Input ; O---Output ; P---Power/Ground

Note.2

Suggest to connection with an RC reset circuit for stability , Normally pull high . (R=10K , C=0.1uF)

Note 3

-STBYB="H (3.3V)": normal operation ;

-STBYB="L (GND)": timing controller, source driver will turn off, all output are High-Z

Note.4

-DIMO = "(GND)" : Turn off external backlight controller

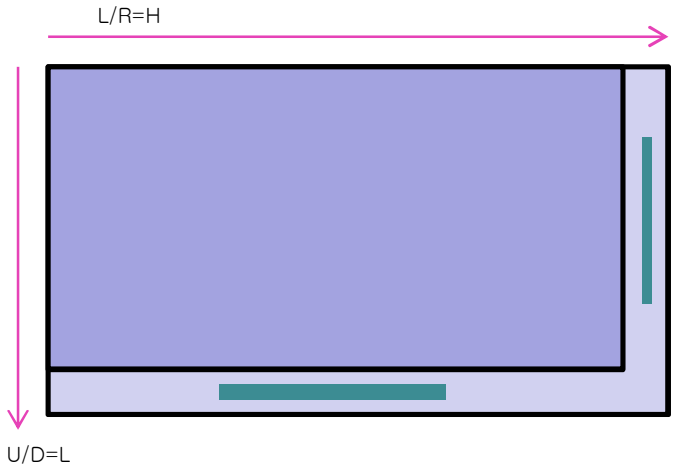
-DIMO = "H (3.3V)" : Logical control signal to turn on external backlight controller

NOTE : If CABC OFF , DIMO = DIMI . Else DIMO is controlled by CABC

Note.5

-SELB="H (3.3V)": 6 bit ;

Scan Control Input		Scanning direction
L/R	U/D	
VDD	GND	Up to Down, Left to Right
GND	GND	Up to Down, Right to Left
VDD	VDD	Down to Up, Left to Right
GND	VDD	Down to Up, Right to Left



Note.6

-When CABC_EN="00", CABC OFF. (Default mode)

- When CABC_EN="01", User interface Image.

-When CABC_EN="10", Still Picture.

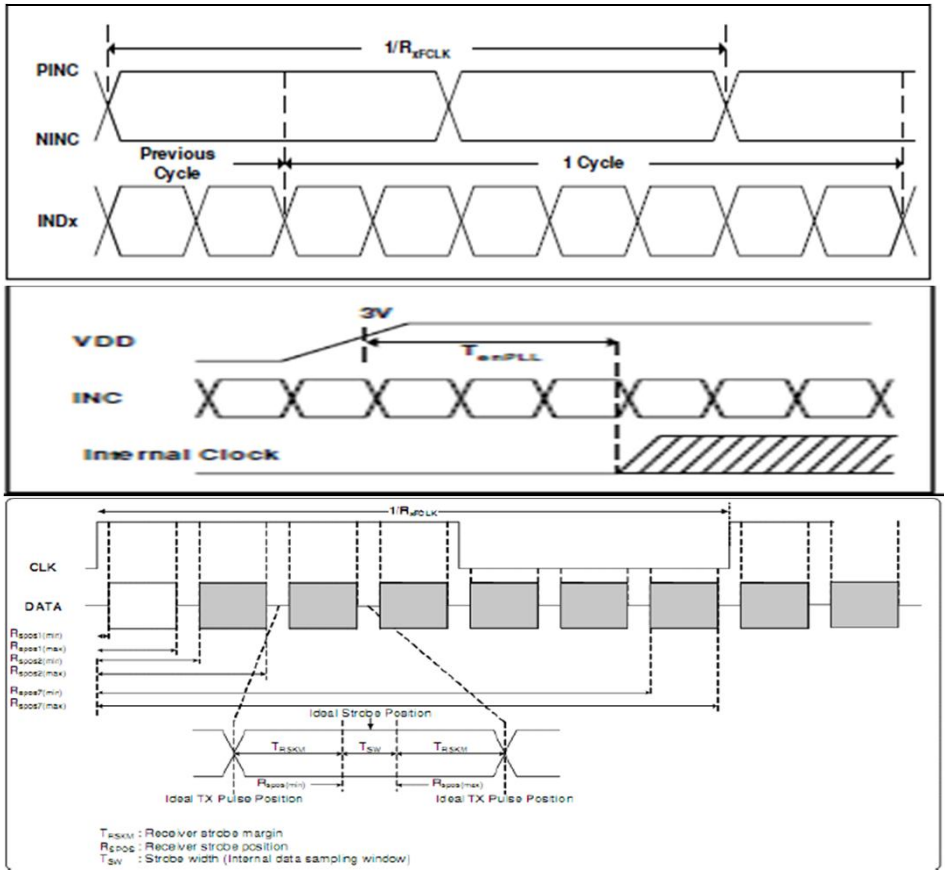
-When CABC_EN="11", Moving Image.

4.0 LVDS Rx INTERFACE TIMING PARAMETER

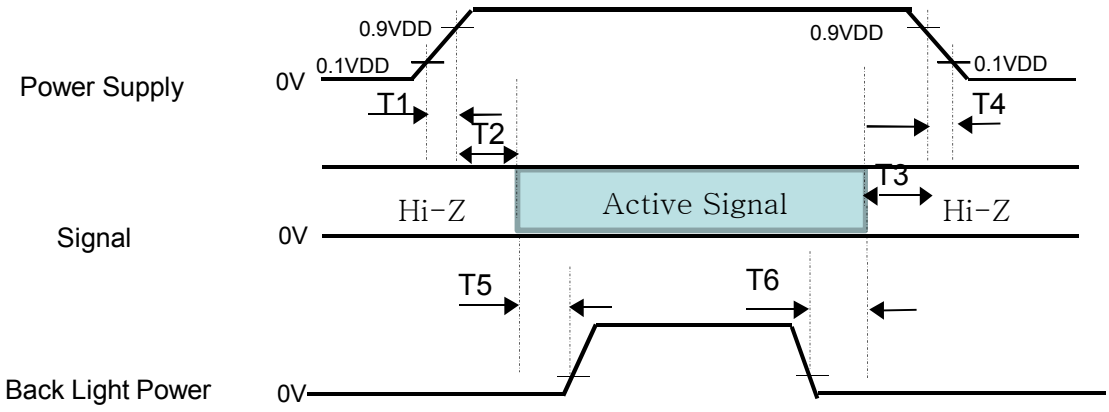
The specification of the LVDS Rx interface timing parameter is shown in Table 6.

< Table 6. AC Electrical Characteristics>

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Clock frequency	RxFCLK	40.8	51.2	67.2	MHz	
Input data skew margin	TRSKM	500	-	-	ps	|VID|=400mV RxVCM=1.2V RxFCLK=71MHz
Clock high time	TLVCH	-	4/ (7*RxFCLK)		ns	
Clock low time	TLVCL		3/ (7*RxFCLK)		ns	
PLL wake-up time	TenPLL			150	us	



5.0 POWER SEQUENCE



- 0.5ms ≤ T1 ≤ 10 ms
- 0 ms ≤ T2
- 0 ms ≤ T3
- 0 ms ≤ T4 ≤ 10ms
- 100ms ≤ T5 ≤ 300ms
- 100 ms ≤ T6 ≤ 300ms

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

6.0 OPTICAL SPECIFICATION

6.1 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°. We refer to θØ=0 (=θ3) as the 3 o"clock direction (the "right"), θØ=90 (= θ12) as the 12 o"clock direction ("upward"), θØ=180 (= θ9) as the 9 o"clock direction ("left") and θØ=270(= θ6) as the 6 o"clock direction ("bottom"). While scanning θand/or Ø, the center of the measuring spot on the Display surface shall stay fixed. Gray scale reversal occur in 6 o 'clock direction. Optimum viewing angle direction is 12 "clock.

6.2 Optical Specifications

< Table 7. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	-	80	-	Deg.	WV-Pol Note 1
		Θ_9		-	80	-	Deg.	
	Vertical	Θ_{12}		-	60	-	Deg.	
		Θ_6		-	70	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	600	800	-		Note 2
Cell Transmittance		Tr		-	4.4	-	%	Base on C-Light Note 3
White Chromaticity		x_w		TYP. - 0.05	0.303	TYP. + 0.05		Note 4 Base on C-Light
		y_w			0.339			
Reproduction of color	Red	R_x			0.605			
		R_y			0.326			
	Green	G_x			0.297			
		G_y			0.568			
	Blue	B_x			0.144			
		B_y			0.175			
Color Gamut (C light)				-	50	-	%	
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C Θ = 0°	-	25	40	ms	Note 5

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

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 .
   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 with Polarizer.

4. The color chromaticity coordinates specified in Table 7 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.

5. The electro-optical response time measurements shall be made as FIGURE 3 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 Td.

7.0 RELIABLITY TEST

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

<Table 8. Reliability Test Parameters >

No	Test Items	Conditions	
1	High temperature storage test	Ta = 80 ℃, 240 hrs	Note 1
2	Low temperature storage test	Ta = -30 ℃, 240 hrs	
3	High temperature & high humidity (operation test)	Ta = 60 ℃, 90%RH, 240hrs	
4	High temperature operation test	Ta = 70 ℃, 240hrs	
5	Low temperature operation test	Ta = -20 ℃, 240hrs	
6	Thermal shock	Ta = -30 ℃ ↔ 80 ℃ (0.5 hr), 100 cycle	
7	Image Sticking	25℃±2℃, 4hr, Image Sticking pattern, Mid-gray pattern inspection, Recovery Time：5min	
8	Shock (Non-Operation)	100G,6ms,±X, ±Y, ±Z,3times for each direction	Note 2
9	Vibration (Non-Operation)	5-200Hz,1.47G,Random XY±Z,30min	
10	Electro-static discharge test	Contact mode：150pf, 330Ω, ±4KV Air mode：150pf, 330Ω, ±6KV	

8.0 APPENDIX

Figure 1. The Definition of Vth & Vsat

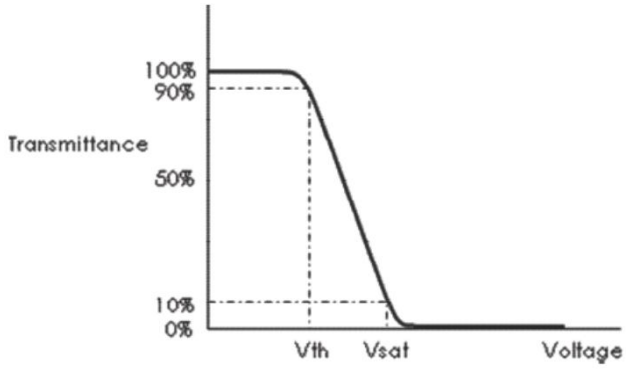


Figure 2. Measurement Set Up

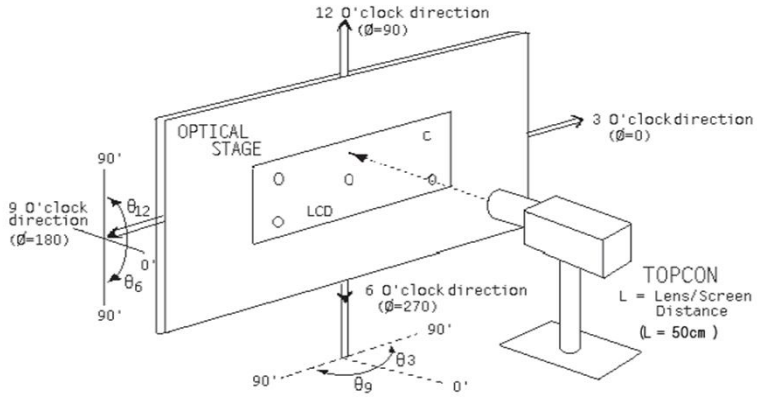


Figure 3. Response Time Testing

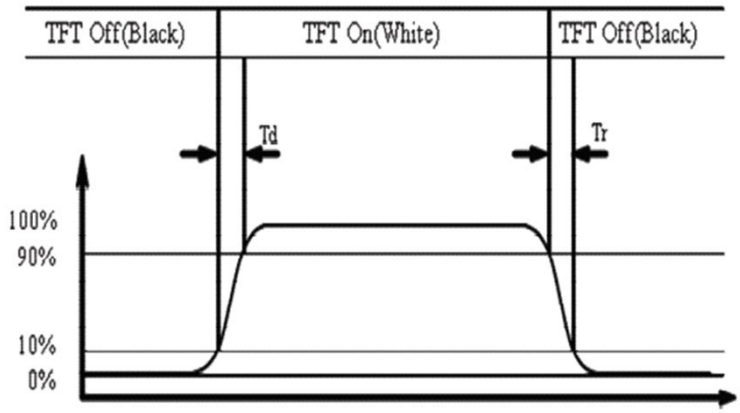
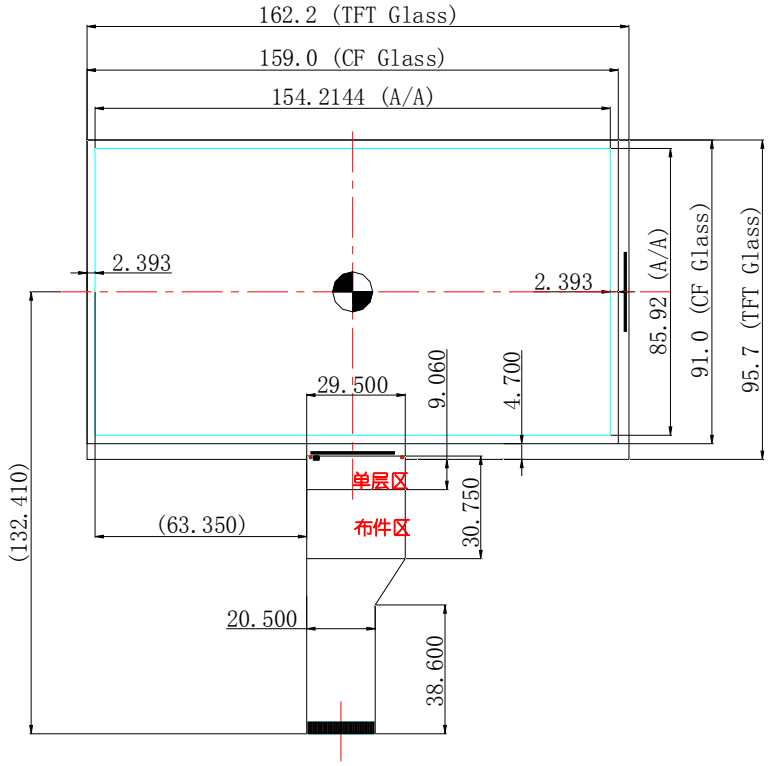
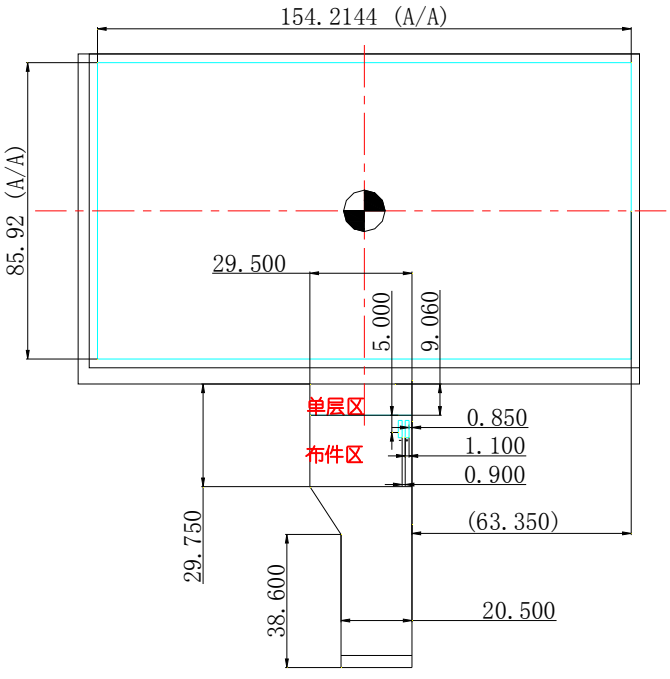


Figure 4. FOG Outline Dimension

front



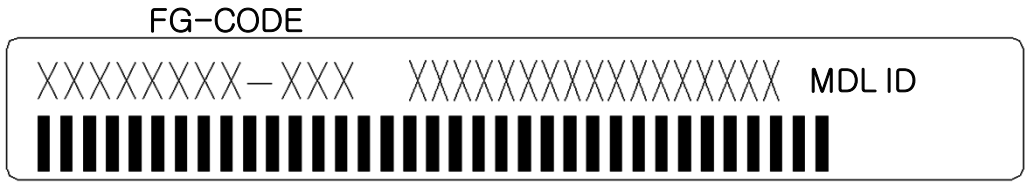
rear



Unit:mm

10.0 PACKING INFORMATION

10.1 Product Serial Number



MDL ID 条纹码

1. 产品标签尺寸: **35mm × 6mm**
2. **MDL ID** 编码规则如下

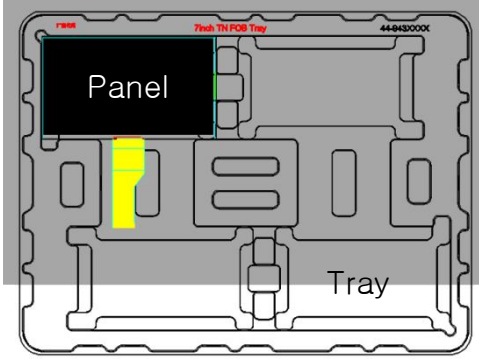
序列号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码	4	F	P	3	1	2	7	3	8	0	0	0	0	1	E	E	J
描述	GBN代码		等级	B3	年份		月	FG Code后四位				序列号					

10.0 PACKING INFORMATION

10.2 Packing Follow

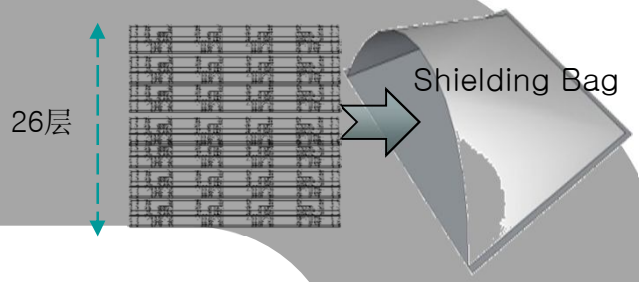
-. 将 4pcs Panel 平放入Tray

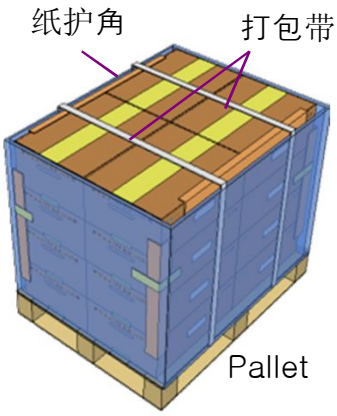
-. CF 侧向上放置



-. 将26pcs PET Tray 平放入屏蔽袋进行抽真空;

-. 顶部1pcs 空Tray;

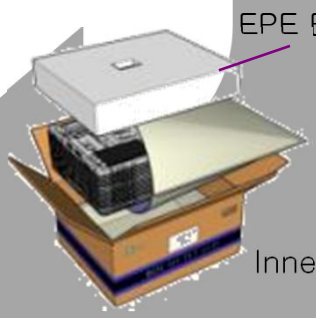




-. 每个Pallet上放3层Box
1层4箱,共计12ea Box

-. Pallet外进行缠膜包装

-. 容量: 1200pcs/Pallet



-. .将PET Tray堆码后平放入Inner Box上下放置EPE Board

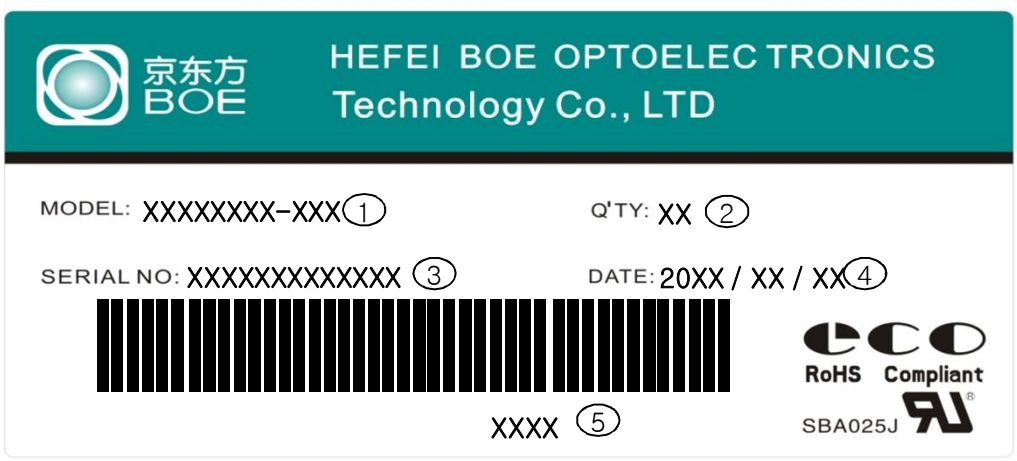
-. 容量 : 100pcs/Inner Box

-.Box Size: 500mm × 400mm × 300mm

-.Pallet Size: 1030mm × 830mm × 1030mm

10.3 Box label

- Label Size : 115 mm (L) × 55 mm (W)
- Contents
  Model : AT070WSB-NW1
  Q`ty : XX Module in one box.
  Serial No. : Box Serial No. See next page for detail description.
  Date : Packing Date
  FG Code : FG Code of Product



1. **FG-CODE**
2. **Box 产品数量**
3. **Box ID, 编码规则如下**
4. **Box Packing 日期**
5. **FG-CODE 后四位**

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13
代码	4	J	P	3	1	2	7	0	0	0	1	H	D
描述	GBN代码		等级	B3	年份		月	Rev	序列号				

10.0 HANDLING & CAUTIONS

10.1 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.

10.2 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.

10.3 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.

10.4 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.

10.5 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.

10.6 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.

10.7 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.