AV080WSB-NW0 Product Specification

Rev. P1

BEIJING BOE OPTOELECTRONICS TECHNOLOGY

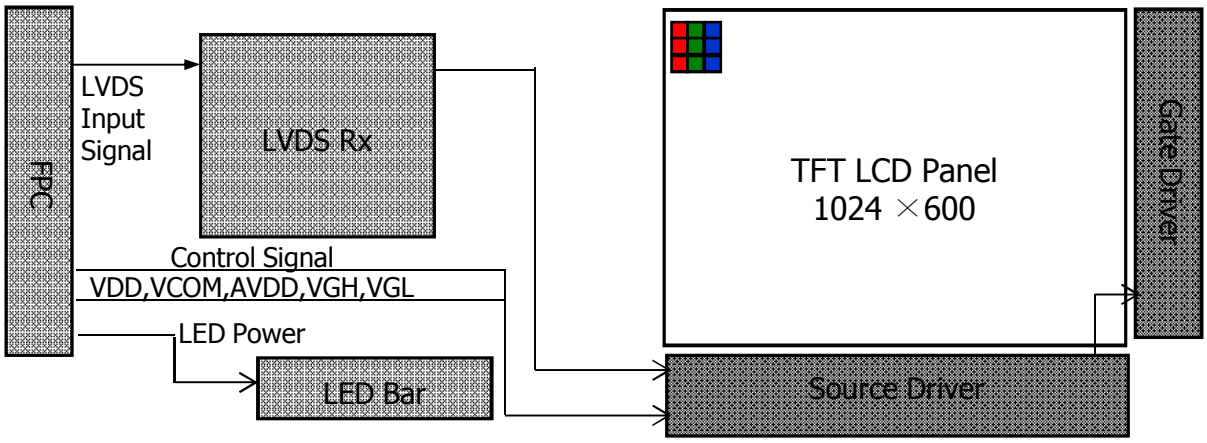
REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0	-	Initial Release	2015.03.03	Zhaoxiuqiang

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

AV080WSB-NW0 is a color active matrix TFT LCD module using amorphous silicon TFT‘ s (Thin Film Transistors) as an active switching devices. It is a transmissive type display operating in the normal black. The TFT-LCD has a 8.0 inch diagonally measured active area with WSVGA resolutions (1024 horizontal by 600 vertical pixel arrays). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this panel can display 16.7M colors. The TFT-LCD panel used for this module is adapted for a low reflection and higher Luminance type.



1.2 Features

- High Luminance :600
- Wide viewing angle (U/D/L/R)：80/80/80/80
- 1 Channel LVDS Interface with 1 pixel / clock
- 6+2(HFRC)bit color depth, display 16.7M colors

1.3 Application

- **Vehicle-mounted Production**

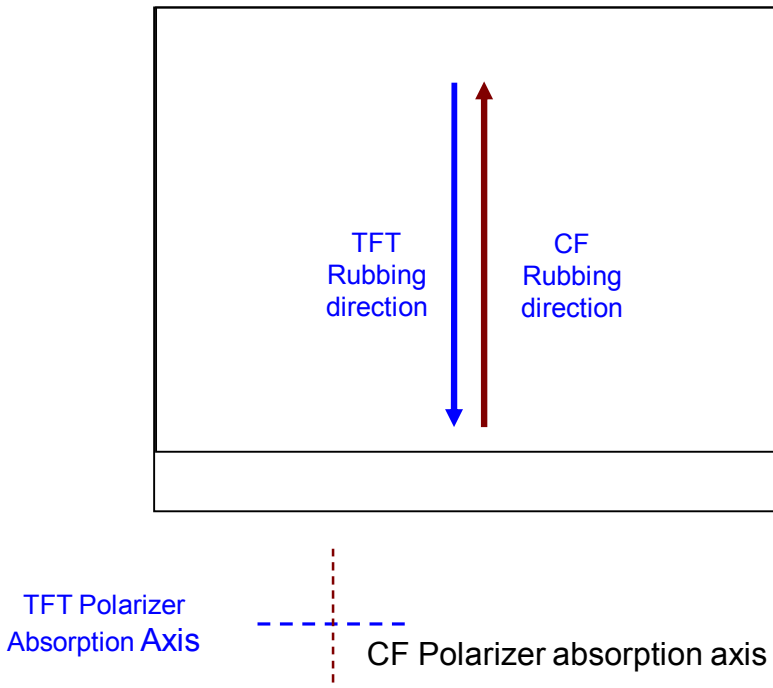
1.4 General Specification

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	176.64 (H) × 99.36 (V)	mm	
CF size	185.3(H) × 109.5(V)	mm	
Number of pixels	1024(H) ×600(V)	pixels	WSVGA
Pixel pitch	0. 0575(H) ×RGB×0.1656(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.7M	colors	
Color gamut	50	%	
Display mode	Normally black		
Panel Size	189.4(H) x 114.5(V)x1.27	mm	
Viewing Direction (Human Eye)	U/D/L/R 80/80/80/80		
D-IC	Source:HX8282_A01 Gate:HX8696_A		

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

2. The TFT and CF rubbing direction:



3. Up Polarizer absorption axis is parallel with C/F rubbing direction, Down Polarizer absorption axis is vertical with TFT rubbing direction, shown in the picture of Note 2.

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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 2-1, 2-2.

< Table 2-1. Environment Absolute Maximum Ratings>

Parameter	Symbol	Min.	Max.	Unit	Remarks
LC operating Voltage *1)	V_{OP}		4.2	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

< Table 2-2. TFT LCD Module>

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power supply voltage	V_{DD}	-0.3	3.96	V	
	V_{GH}	-0.3	VGL+40.0	V	
	V_{GL}	-20.0	0.3	V	
	AV_{DD}	6.5	13.5	V	
Logic Signal Input Level	V_{DD}	-0.3	3.96	V	

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

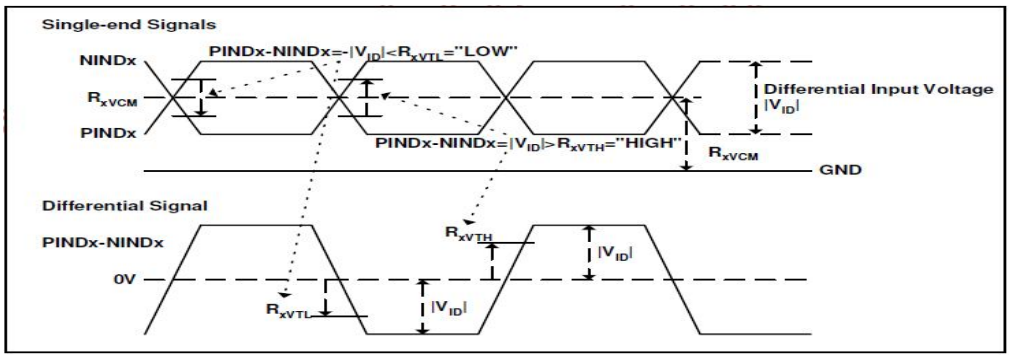
3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

Ta=25+/-2°C

< Table 3. Electrical specifications >

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	
Analog Voltage		AVDD	11.3	11.5	11.7	V	
TFT Gate ON Voltage		VGH	20	21	22	V	
TFT Gate OFF Voltage		VGL	-9.7	-10	-10.3	V	
TFT Common Electrode Voltage		VCOM	4.5	4.7	4.9	V	
Power Consumption		PDD		TBD	0.45	Watt	1
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		
Power Consumption		PDD	-	TBD	0.45	W	1



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.

<Table 4. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	-	80	-	Deg.	Note 1
		Θ_9		-	80	-	Deg.	
	Vertical	Θ_{12}		-	80	-	Deg.	
		Θ_6		-	80	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle	600	800	-		Note 2
White luminance uniformity		ΔY		70	80		%	Note 3
White Chromaticity		x_w		Typ-0.03	0.300	Typ+0.03		Note 4 C light
		y_w			0.325			
Reproduction of color	Red	x_R			0.600			
		y_R			0.367			
	Green	x_G			0.320			
		y_G			0.567			
	Blue	x_B			0.149			
		y_B			0.120			
Threshold Voltage		Vsat		3.7	3.9	4.1	V	Figure 3
		Vth		1.8	2.0	2.2	V	
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C Θ = 0°	-	25	35	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.
2. Contrast measurements shall be made at viewing angle of $\theta = 0°$ 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 FIGURE 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

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

3. The White luminance uniformity on LCD surface is then expressed as :
   ΔY = (Minimum Luminance of 9points / Maximum Luminance of 9points) * 100
4. The color chromaticity coordinates specified in Table 4. 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 5 shown in Appendix by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Td, and 90% to 10% is Tr.

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

The electronics interface connector is **FH12A-40S-0.5SH**. The connector interface pin assignments are listed in Table 5.

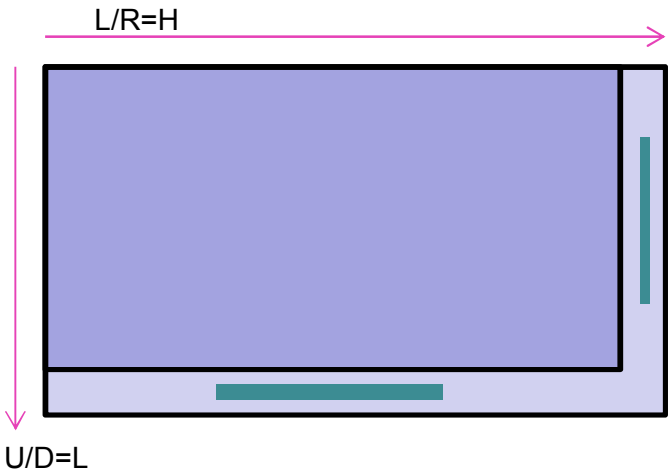
<Table 5. Pin Assignments for the Interface Connector>

Pin No.	Symbol	Description	Remark
1	VCOM	Common_Voltage_4.5V	
2	VDD	Digital power_3.3V	
3	VDD	Digital power_3.3V	
4	NC	Not connect	
5	RESET	Global reset pin	
6	U/D	Vertical inversion	Note1
7	L/R	Horizontal inversion	Note1
8	STBYB	Standby mode	
9	GND	Ground	
10	RXCLKIN-	Negative LVDS differential clock input	
11	RXCLKIN+	Positive LVDS differential clock input	
12	GND	Ground	
13	RXIN0-	Negative LVDS differential data input	
14	RXIN0+	Positive LVDS differential data input	
15	GND	Ground	
16	RXIN1-	Negative LVDS differential data input	
17	RXIN1+	Positive LVDS differential data input	
18	GND	Ground	
19	RXIN2-	Negative LVDS differential data input	
20	RXIN2+	Positive LVDS differential data input	
21	GND	Ground	
22	RXIN3-	Negative LVDS differential data input	
23	RXIN3+	Positive LVDS differential data input	
24	GND	Ground	
25	SELB	6bit/8bit mode select	Note2
26	GND	Ground	
27	AVDD	Power for Analog Circuit	
28	GND	Ground	
29	VGH	Positive power for TFT	
30	NC	Not connect	

Pin No.	Symbol	Description	Remark
31	NC	Not connect	
32	VGL	Negative power for TFT	
33	GND	Ground	
34	NC	Not connect	
35	LED-	LED cathode	
36	LED-	LED cathode	
37	NC	Not connect	
38	NC	Not connect	
39	LED+	LED Anode	
40	LED+	LED Anode	

Note.1

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



Note. 2

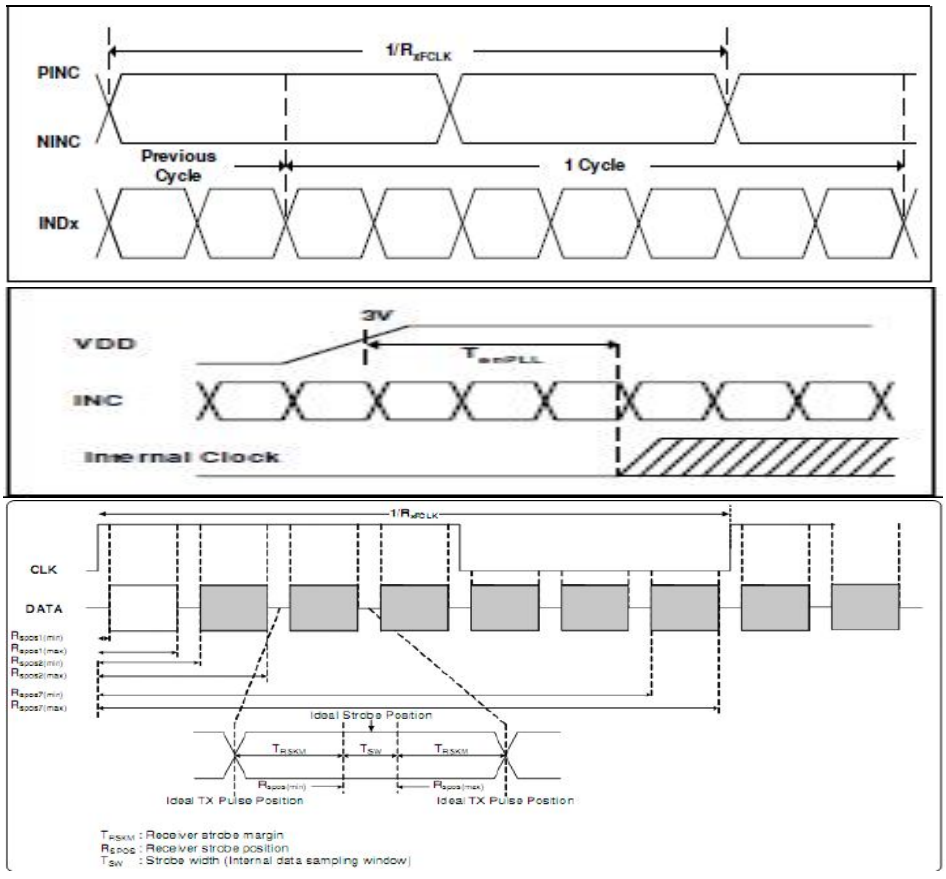
-SELB="H (3.3V)": 6 bit ;

-SELB="L (GND)": 8 bit ;

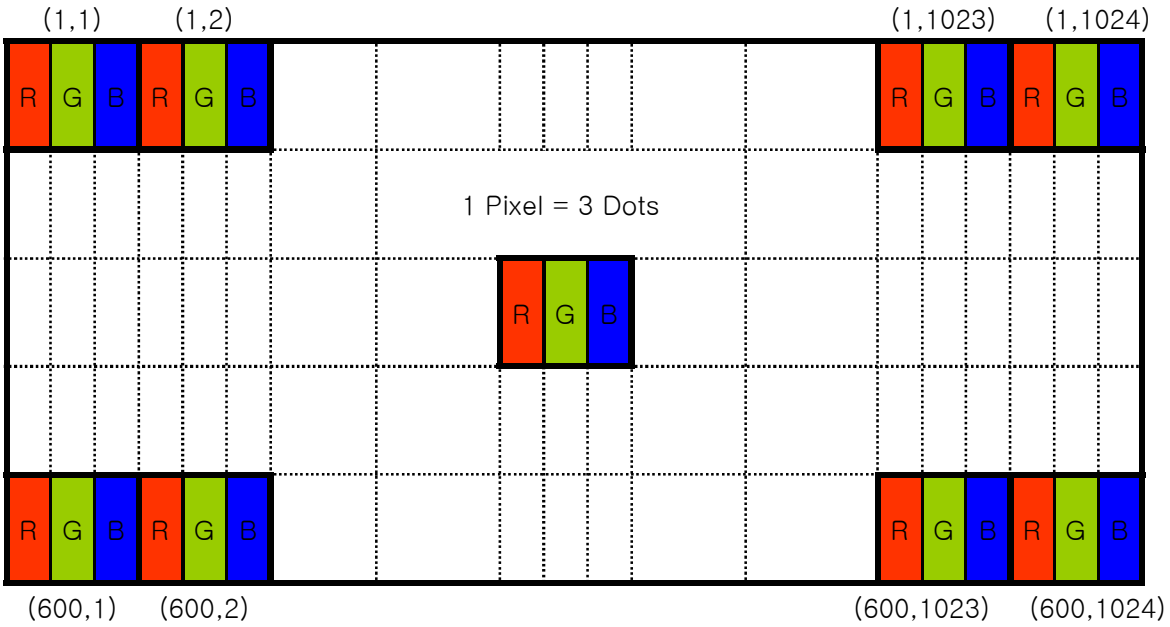
5-2. LVDS signal

< 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	



5.3 Data Input Format



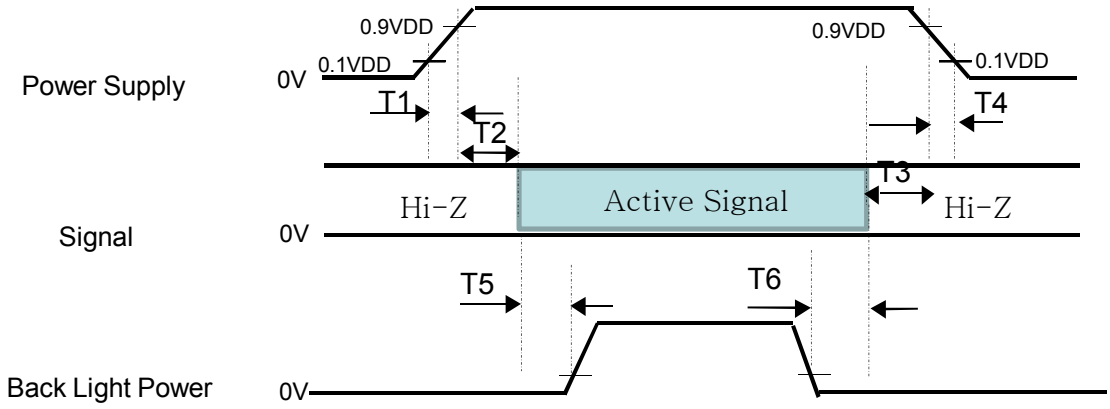
Display Position of Input Data (V-H)

5.4 Back-light & LCM Interface Connection

Interface Connector: Two Hot Pad

6.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below



- 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.

7.0 MECHANICAL CHARACTERISTICS

7.1 Dimensional Requirements

Figure 6 shown in appendix shows mechanical outlines for the panel

<Table 7. Dimensional Parameters>

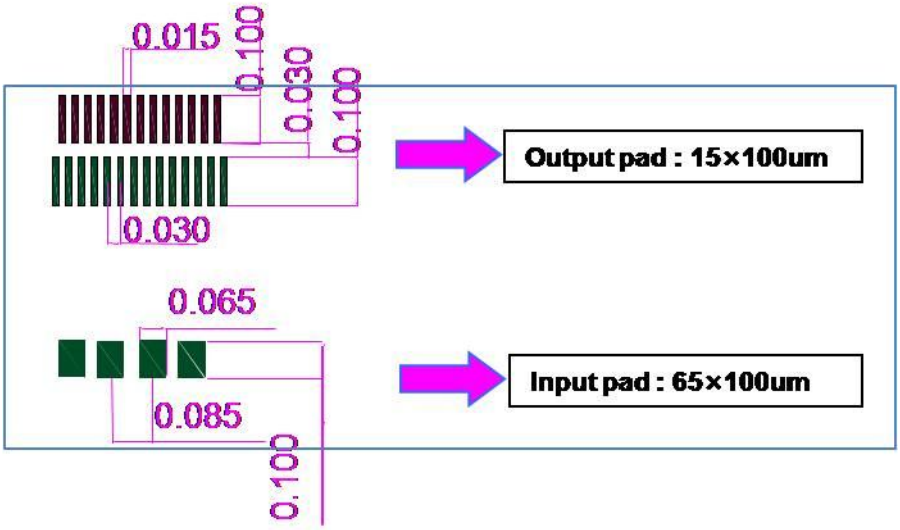
Parameter	Specification	Unit
Active Area	176.64 (H) × 99.36 (V)	mm
CF size	185.3(H) × 109.5(V)	mm
Number of pixels	1024(H) ×600(V)	Pixels
Pixel pitch	0. 0575(H) ×RGB×0.1656(V)	mm
Pixel arrangement	RGB Vertical stripe	
Display colors	16.7M	colors
Display mode	Normally black	
Panel Size	189.4(H) x 114.5(V)x1.27	mm

8.0 RELIABILITY TEST

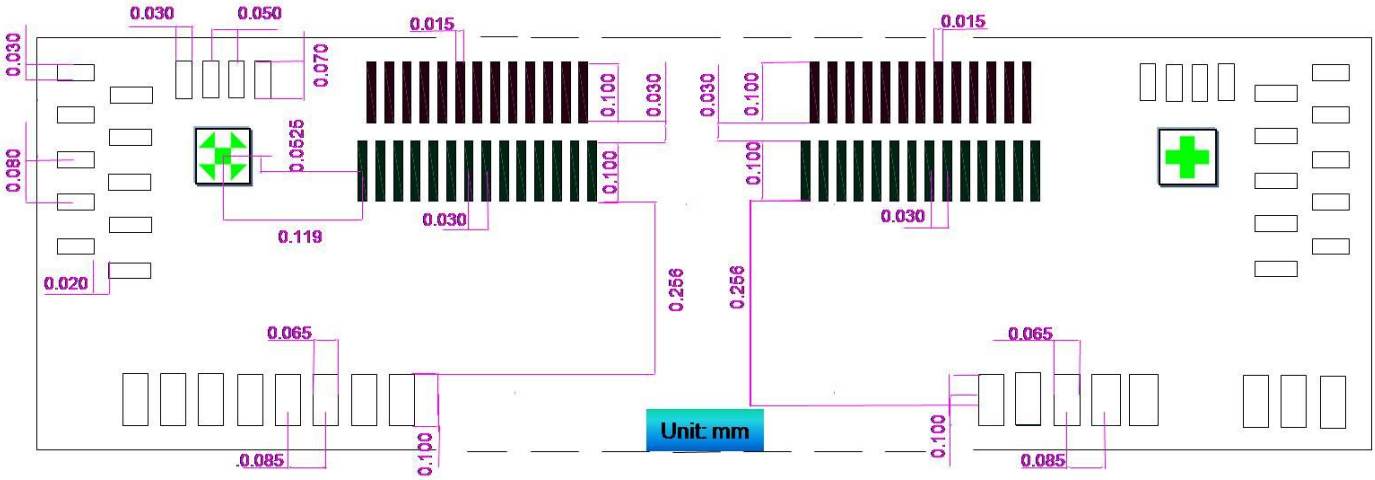
<Table 8. Reliability test>

No	Test Items	Conditions
1	High temperature storage test	Ta = 80 ℃, 240 hrs
2	Low temperature storage test	Ta = -30 ℃, 240 hrs
3	High temperature operation test	Ta = 70 ℃, 240 hrs
4	Low temperature operation test	Ta = -20 ℃, 240 hrs
5	High temperature & high humidity operation test	Ta = 60 ℃, 90%RH, 240 hrs
6	Thermal shock	Ta = -20 ℃ ↔ 70 ℃ (0.5 hr), 100 cycle
7	ESD	150pF 330Ω Contact ±6kV 10points (1time/point) Air ±8KV 10points (1time/point)
8	Image Sticking	25℃ 5*5 Pattern 4hrs Recovery Time:5min

9.0 Source Drive IC PAD Dimension

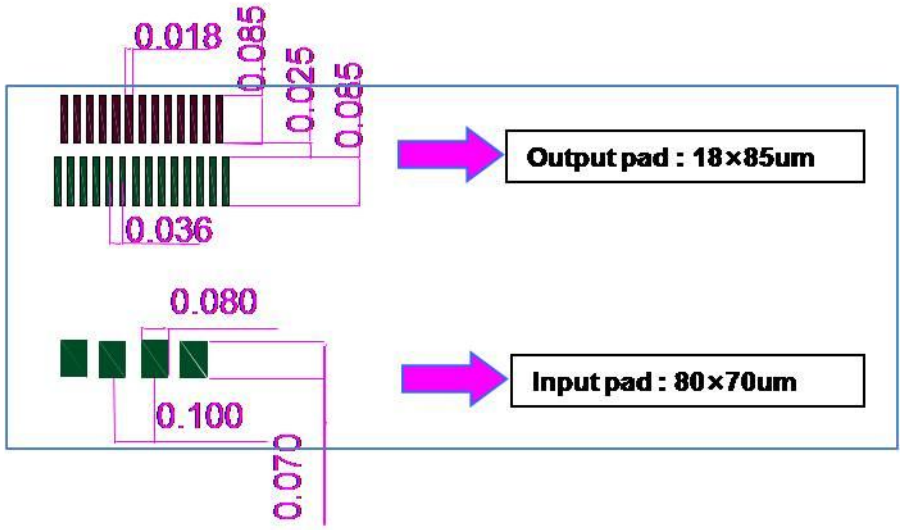


HX8282_A01_LT

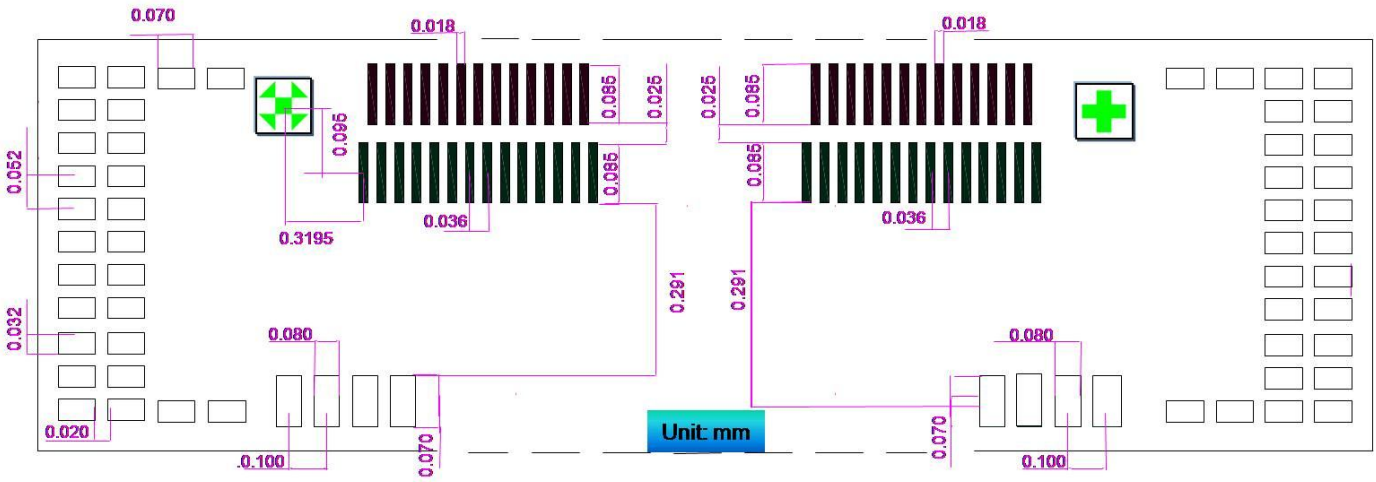


<Figure 1. Source Drive IC PAD Dimension>

9.1 Gate Drive IC PAD Dimension

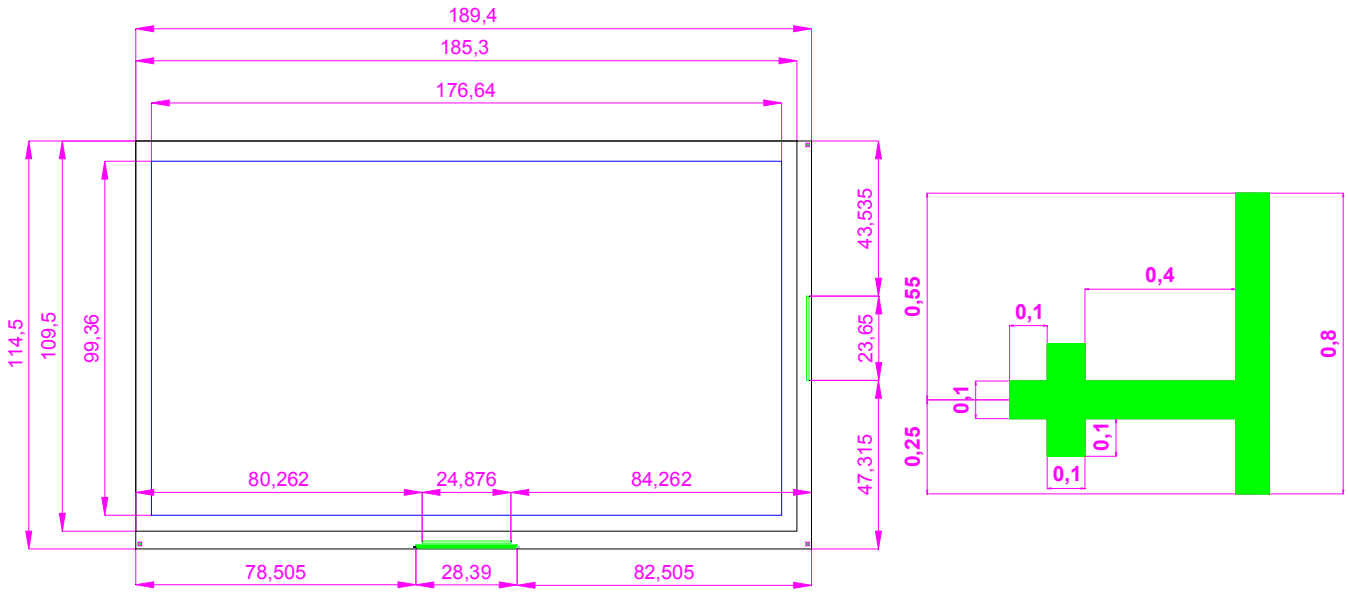


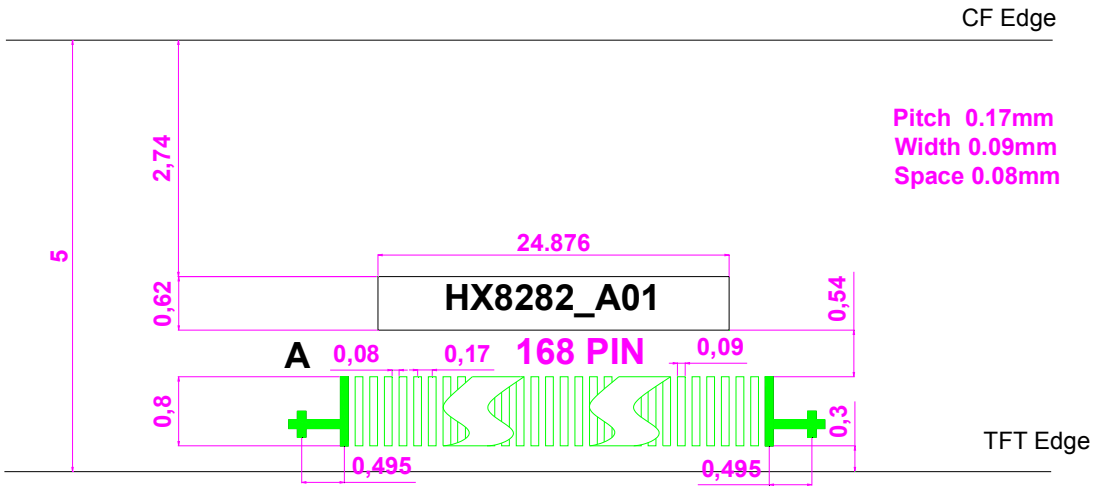
HX8696_A_LT



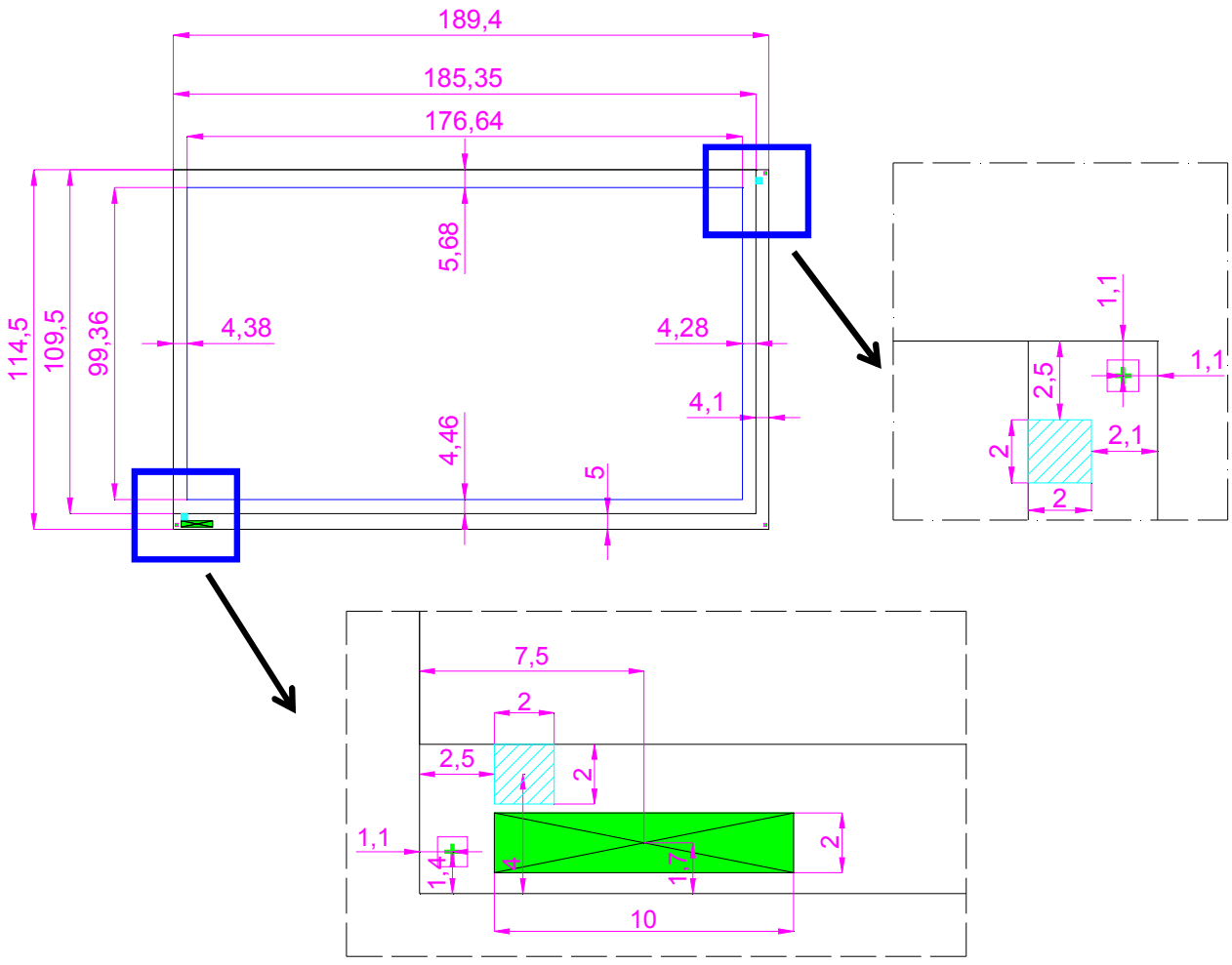
<Figure 2. Gate Drive IC PAD Dimension>

9.2 Drive IC Assignment





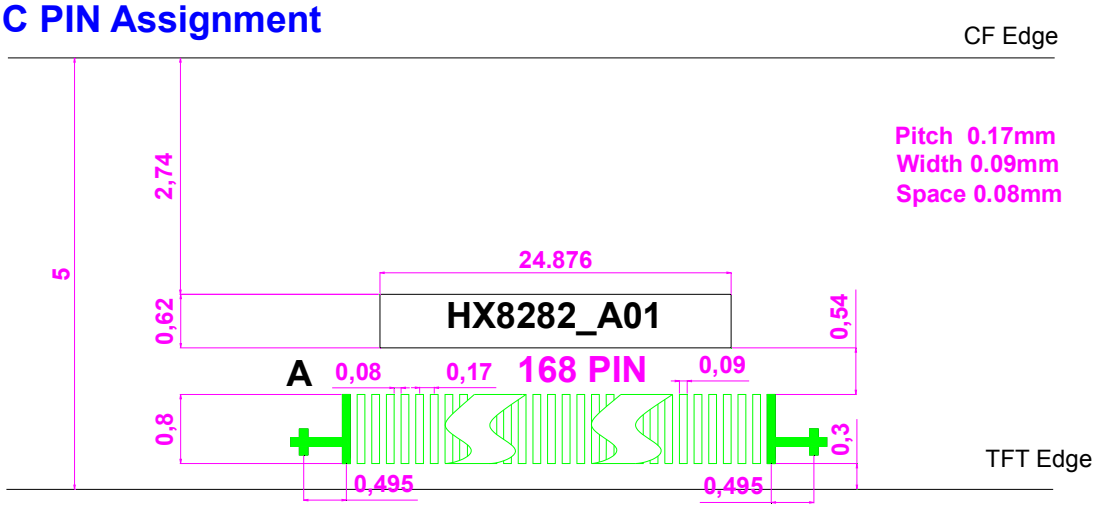
9.3 Ag Dotting Diagram



Note:

1) Dotting position available: 2.0mm×2.0mm;
2) Detailed position and rule:
   a. Ag dotting must contact TFT & CF substrate both and it's for grounding of backside ITO on CF substrate. Detail size & position like the picture above;
   b. Ag dotting pattern on CF substrate can't overlap with polarizer of CF side;
3) Ag paste is just one of the method to conduct TFT & CF substrate, if customer want to use other method, Please contact our technic personnel.

9.4 FPC PIN Assignment



No.1	DUMMY	No.35	VDD	No.69	D01	No.103	DEN	No.137	DUMMY
No.2	NULL	No.36	VDD	No.70	D02	No.104	DASHD	No.138	DUMMY
No.3	GND	No.37	DUMMY	No.71	D03	No.105	HSD	No.139	DUMMY
No.4	GND	No.38	RES[2]	No.72	D04	No.106	VSD	No.140	VDD
No.5	VGL	No.39	UPDN	No.73	D05	No.107	GAMH	No.141	VDD
No.6	VCOM	No.40	SHLR	No.74	D06	No.108	V7	No.142	GND
No.7	VCOM	No.41	GRB	No.75	D07	No.109	V6	No.143	GND
No.8	VCOM	No.42	STBYB	No.76	D10	No.110	V5	No.144	AVDD
No.9	VGL	No.43	DCLKPOL	No.77	D11	No.111	V4	No.145	AVDD
No.10	VGL	No.44	RES[1]	No.78	D12	No.112	V3	No.146	AGND
No.11	GND	No.45	DUMMY	No.79	D13	No.113	V2	No.147	AGND
No.12	GND	No.46	BIST	No.80	D14	No.114	V1	No.148	DUMMY
No.13	S1	No.47	IFSEL	No.81	D15	No.115	AGNDH	No.149	DUMMY
No.14	VCOMO	No.48	MODE	No.82	D16	No.116	AGNDH	No.150	COM1_IN
No.15	DRVL_B	No.49	OPDRV	No.83	D17	No.117	AVDDL	No.151	COM1_IN
No.16	DRVL	No.50	CABC_EN1	No.84	REV	No.118	AVDDL	No.152	COM1_IN
No.17	DRVH	No.51	CABC_EN0	No.85	VDD_LVDS	No.119	GND	No.153	COM1_IN
No.18	DRVA	No.52	VDD	No.86	VDD_LVDS	No.120	GND	No.154	VGH
No.19	AVDDG	No.53	VDD	No.87	NINC	No.121	VDD	No.155	VGH
No.20	FBA	No.54	GND	No.88	DCLK	No.122	VDD	No.156	VGH
No.21	FBH	No.55	GND	No.89	DASHD	No.123	SCL	No.157	VGL
No.22	FBL	No.56	AVDD	No.90	D20	No.124	SDA	No.158	VGL
No.23	PWR_EN	No.57	AVDD	No.91	D21	No.125	CSB	No.159	VGL
No.24	VCOMI	No.58	AGND	No.92	DASHD	No.126	SEL1	No.160	VDD
No.25	DUMMY	No.59	AGND	No.93	D22	No.127	SEL0	No.161	VDD
No.26	AGNDH	No.60	V14	No.94	D23	No.128	FRAME	No.162	VDD
No.27	AGNDH	No.61	V13	No.95	DASHD	No.129	DUMMY	No.163	VSS
No.28	DUMMY	No.62	V12	No.96	D24	No.130	DUMMY	No.164	VSS
No.29	AVDDL	No.63	V11	No.97	D25	No.131	HFRC	No.165	VSS
No.30	AVDDL	No.64	V10	No.98	DASHD	No.132	DITHER	No.166	DUMMY
No.31	DUMMY	No.65	V9	No.99	D26	No.133	DIMO	No.167	NULL
No.32	GND	No.66	V8	No.100	D27	No.134	PINCTL	No.168	DUMMY
No.33	GND	No.67	GAML	No.101	GND_LVDS	No.135	NBW		
No.34	DUMMY	No.68	D00	No.102	GND_LVDS	No.136	DIMI		

<Figure 3. FPC Pad Dimension & FPC Pin Assignment>

10.0 APPENDIX

Figure 3. The Definition of Vth & Vsat

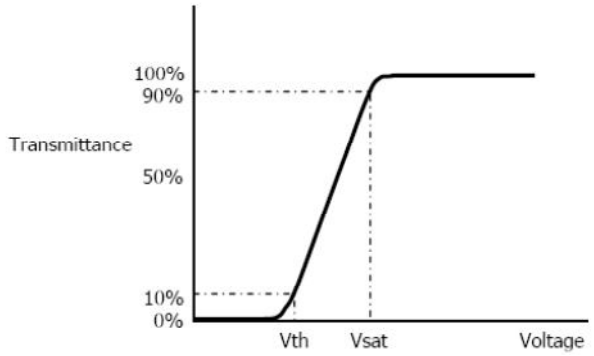


Figure 4. Measurement Set Up

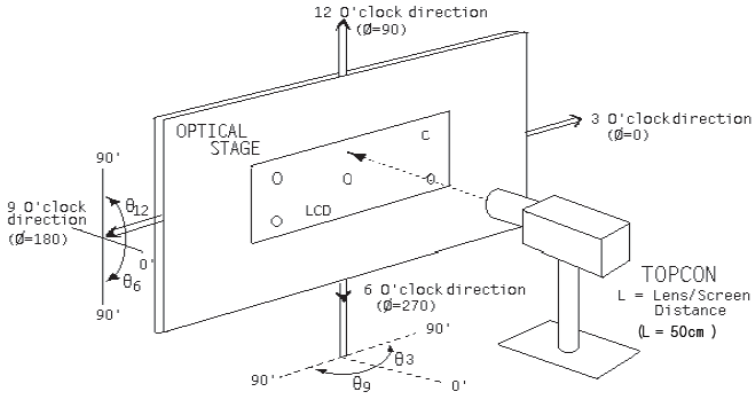


Figure 5. Response Time Testing

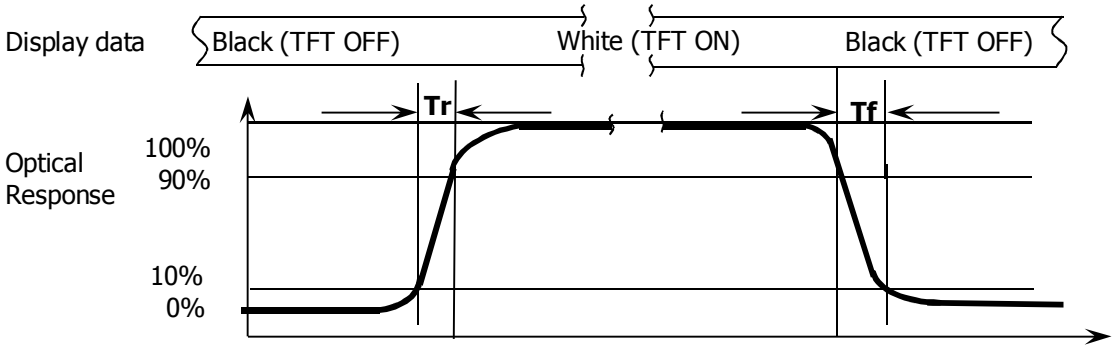
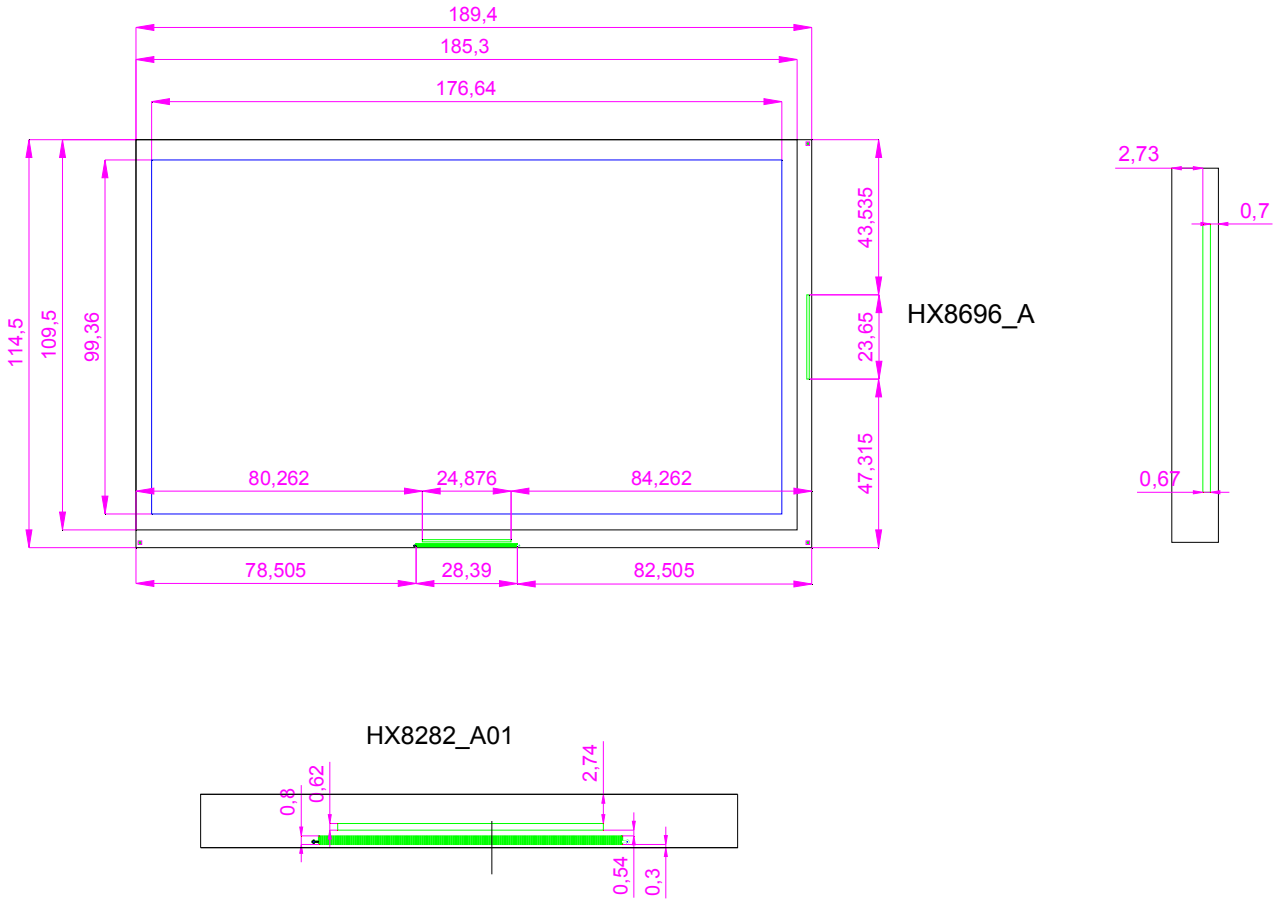


Figure 6. TFT-LCD Panel Outline Dimension



Unit：mm

Figure 7. TFT-LCD Panel Cell Test

ET Test Mode:3D2G1C2S

左下 GO GE GS VCOM DA DS

右上 DM DC DY DS GA GS

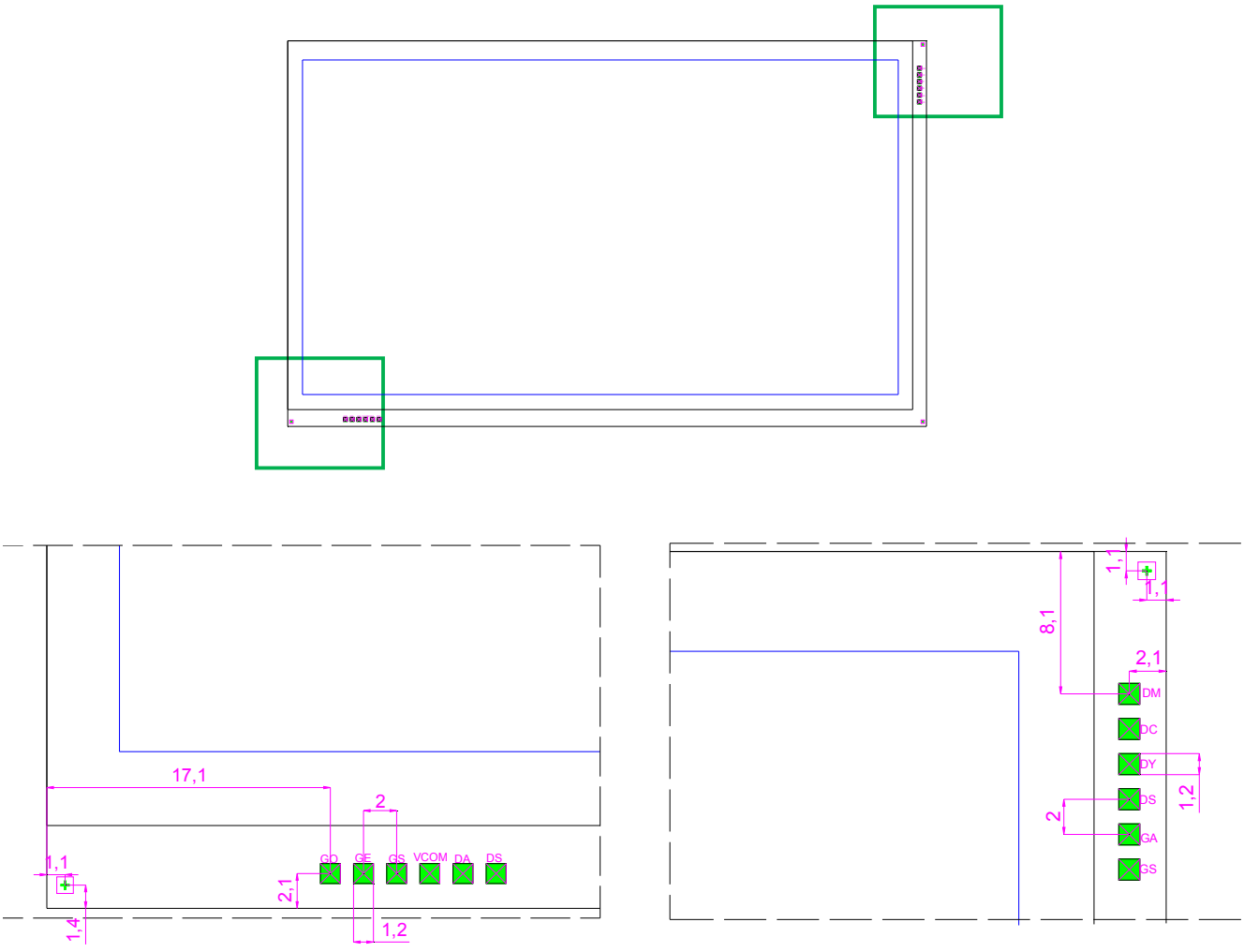


Figure 8. TFT-LCD Q Panel outline dimension

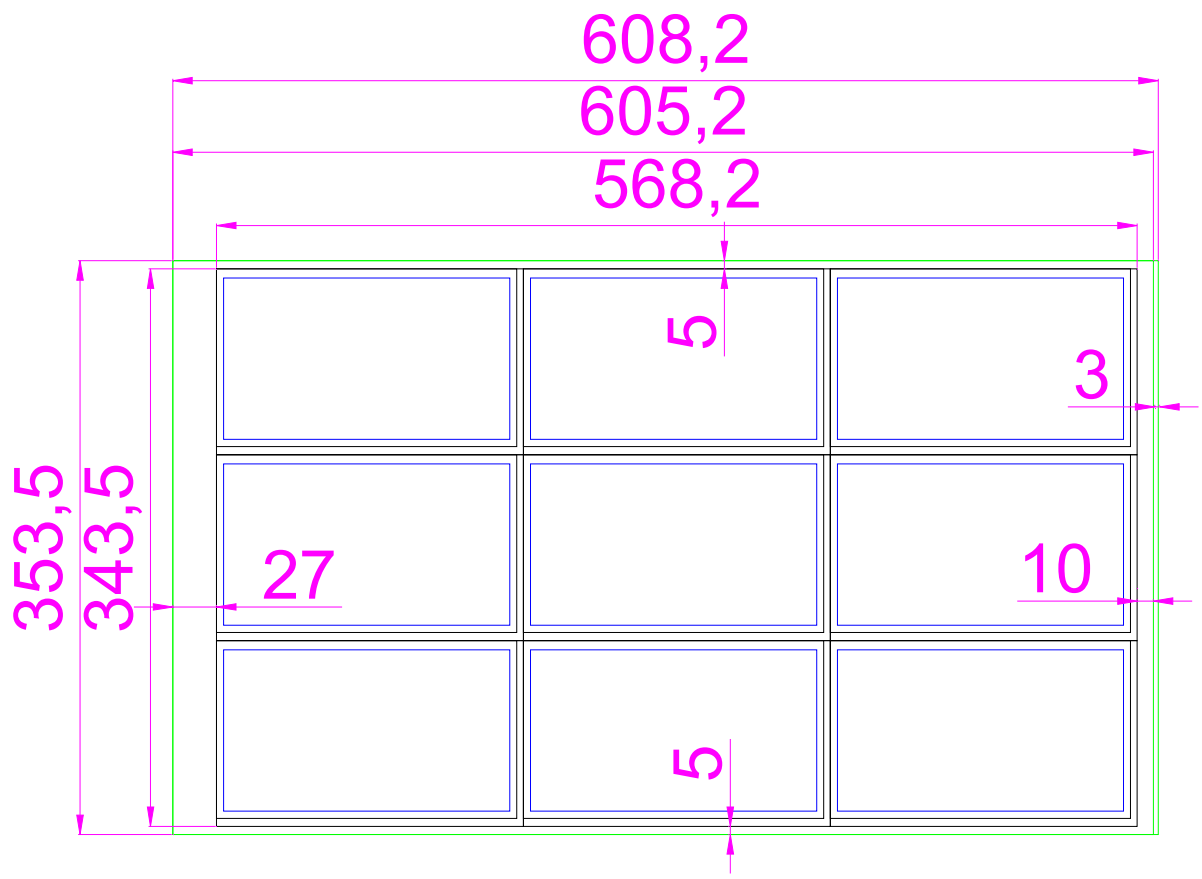
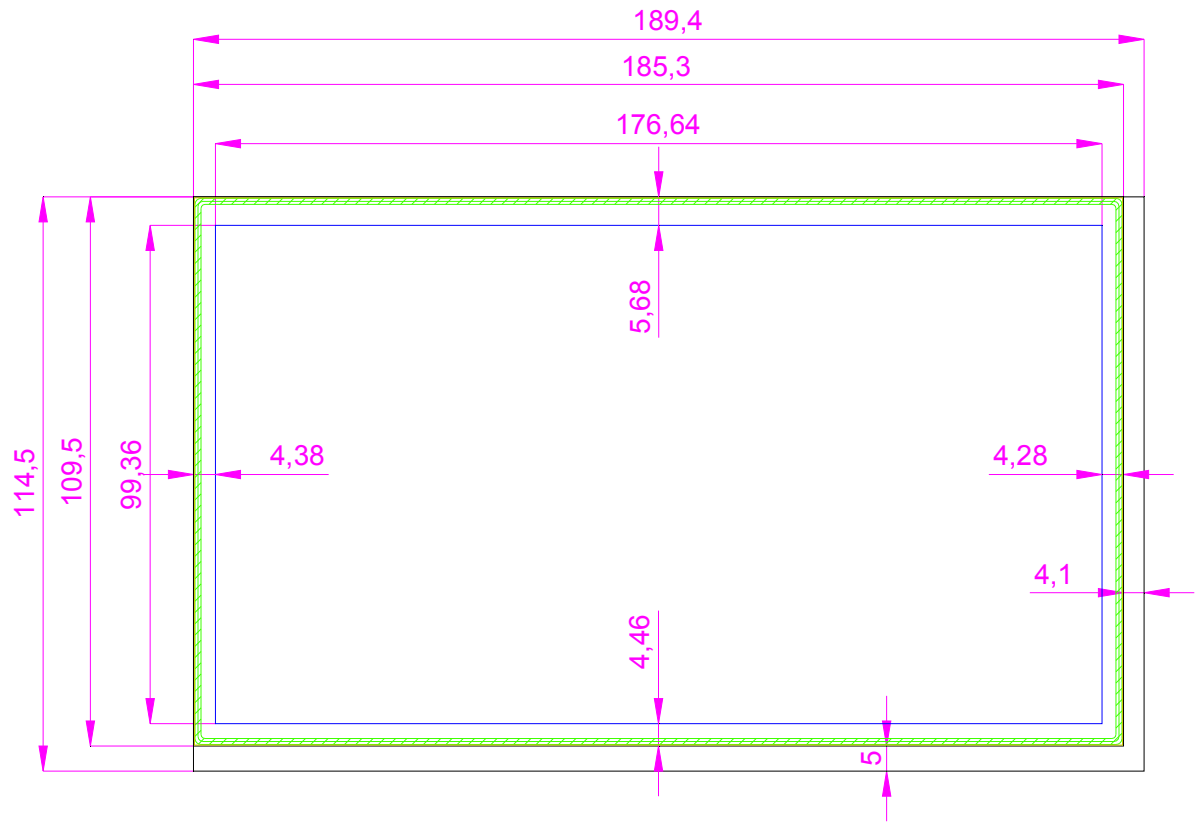
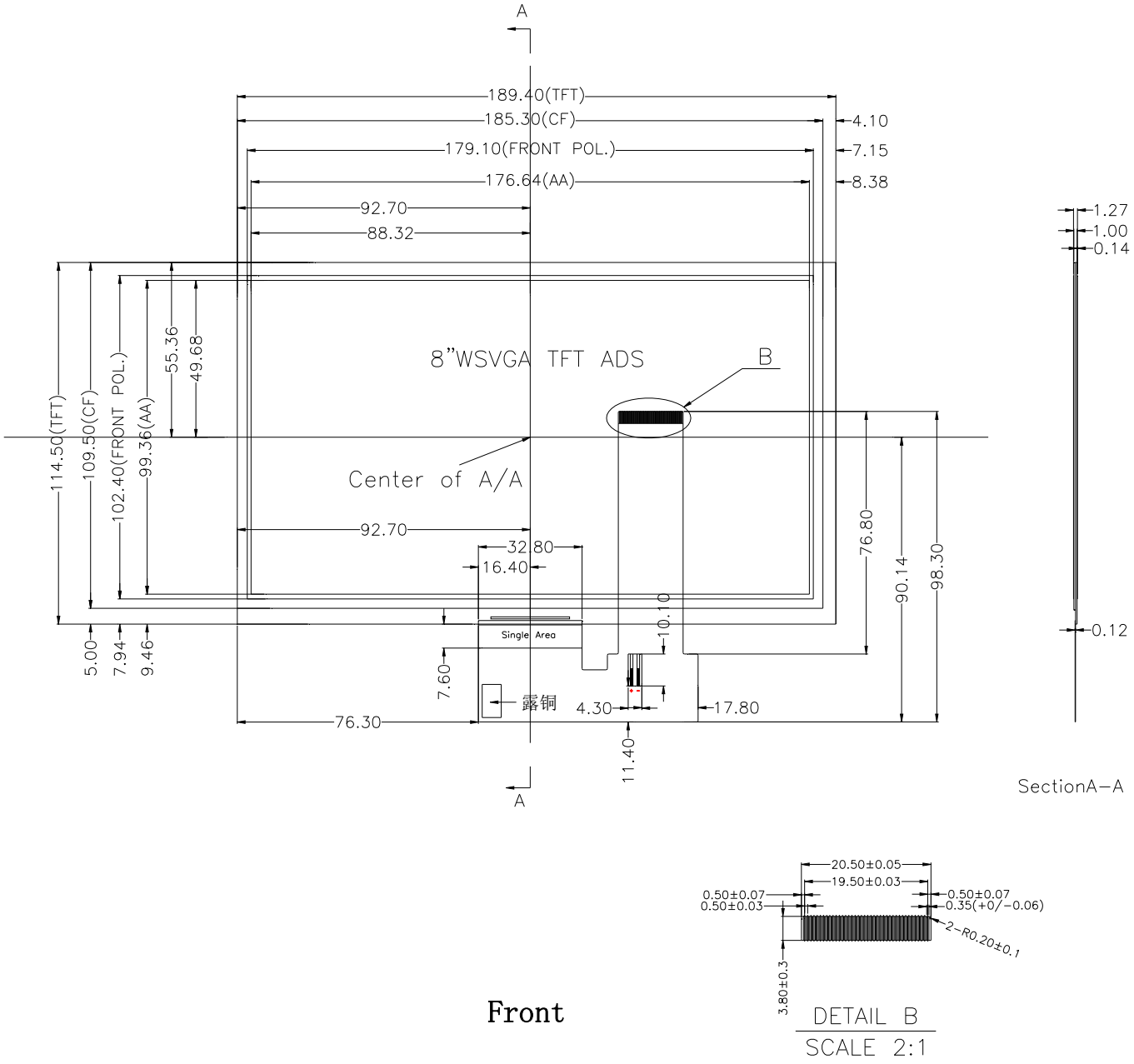


Figure 9. Seal on Panel



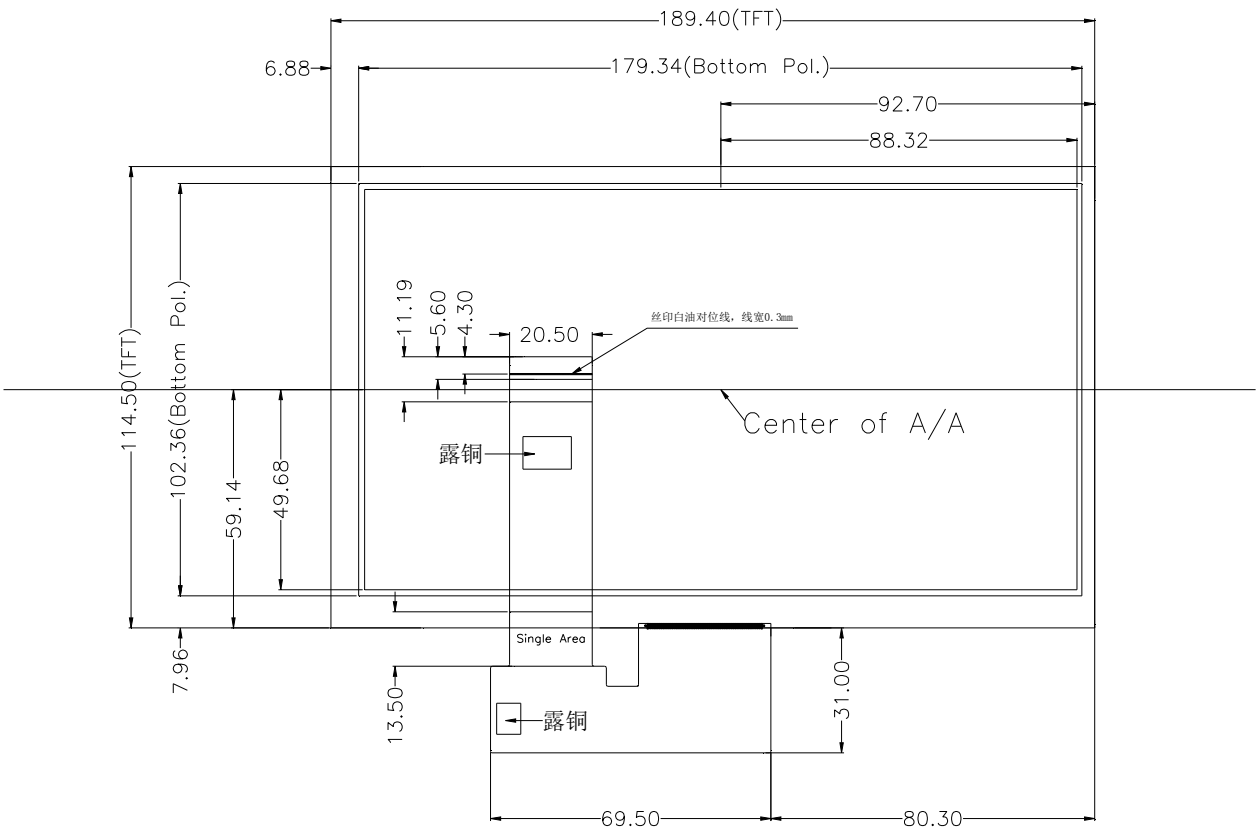
Seal width:1.2±0.15mm
Scribing Accuracy: Target ±0.15mm
Glass Thickness: 0.5+0.5t (No slimming)

Figure 10. TFT-LCD FOG Outline Dimension (Front View)



Front

Figure 11. TFT-LCD FOG Outline Dimension (Rear View)



Back

9. Package

9.1. Packing Description

10. Product ID Rule

13. Handling & Cautions

13.1 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.

13.2 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.

13.3 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.

13.4 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.

13.5 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.

13.6 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.

13.7 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.