Specification
For
Approval

■ Preliminary specification
□ Final specification

Title	12.3 1920RGB720 ADS TFT-LCD (Cell)

Buyer	
Model	

Supplier	Cheng Du BOE Optoelectronics Technology CO., LTD
Model	

TITLE/SIGNATURE	DATE
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Please return one copy confirmation with signature and your comments

ITEM	SIGNATURE/DATE
Approved	_____
Reviewed	_____
Reviewed	_____
Prepared	_____

BOE CHENG DU
Optoelectronics Technology CO., LTD

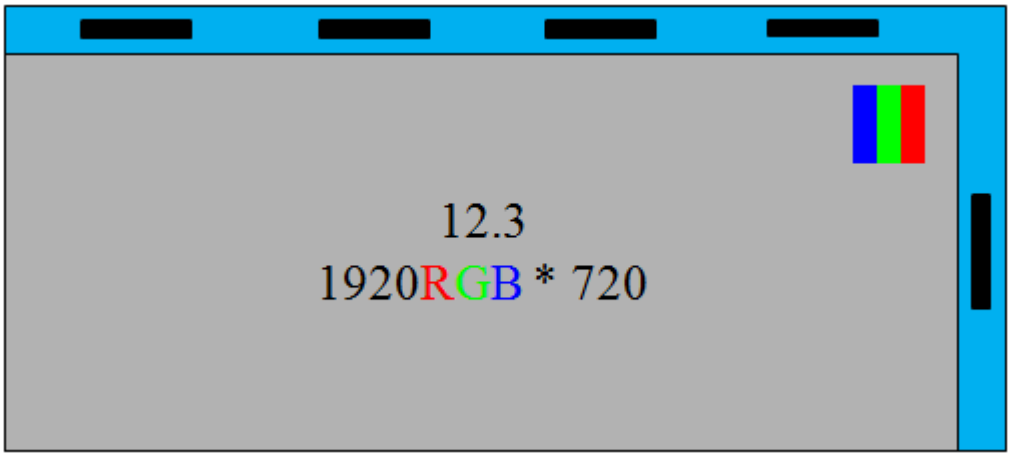
CONTENT LIST

Record of Revisions				
Revision	Date	Page	Description	Released by
Pre.0	2014.08.20		Initial Released	Huangli
Pre.1	2014.11.04	P10 P11	Figure 4 FPC bonding length change Add Figure 5/5.2 FPC Pin Assignment	Huangli

1.0 GENERAL DESCRIPTION

1.1 Introduction

12.3 1920RGB720 is a color active matrix TFT-LCD Panel using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. It is a transmissive type display operating in the normal black. This TFT-LCD has a 12.3 inch diagonally measured active area with 1920 horizontal by 720 vertical pixel array). Each pixel is divided into Red, Green, Blue dots which are arranged in vertical stripe and this panel can display 16.7M colors.



1.2 Features

- 0.5t Glass (Single)
- Thin and light weight
- Full Color
- High luminance and contrast ratio, low reflection and wide viewing angle
- RoHS Compliant

1.3 Application

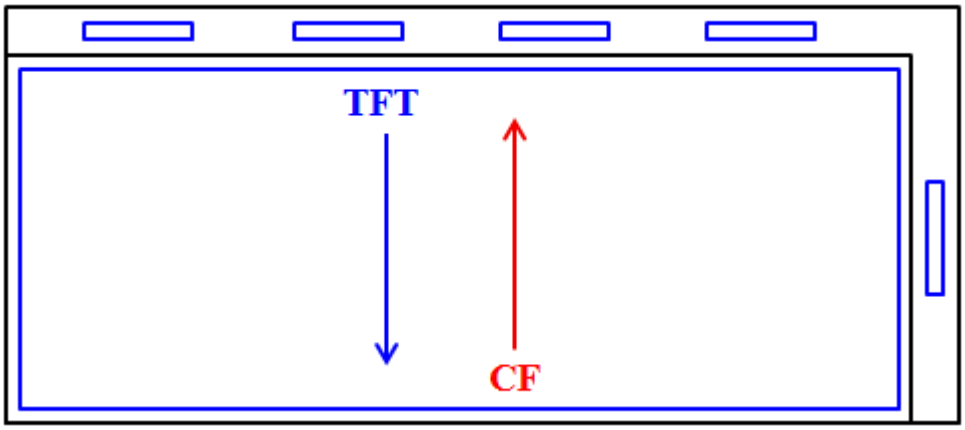
- Application

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

Parameter	Specification	Unit	Remark
Active Area	292.032(H) × 109.512(V)	mm	
Number of Pixels	1920(H) RGB × 720(V)	pixels	
Pixel Pitch	0.1521(H) × 0.1521(V)	mm	
Pixel Arrangement	RGB Vertical stripe		
Display Colors	16.7 M	colors	
Color Gamut	70%(typ.)		
Display Mode	Normally black, Transmissive mode		
Dimensional Outline	305.4(H) × 124.2(V) × 1.0(D)	mm	Unit Cell
Viewing Direction (Human Eye)	U/D/L/R free viewing direction		Note 1,2
Weight	TBD	gram	

Note:

1. At the U/D/L/R direction, the viewing angle is same;
2. The TFT and CF Rubbing Direction;



3. This product's compatible IC is HX8695-E (Gate) / HX8298-A × 4(Source), Please contact IC manufacturer and verify it when you choose any one of them. The information we suppose about IC just for reference.

2.0 ELECTRICAL SPECIFICATION

2.1 Absolute Maximum Ratings

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. Make sure all the design characteristics are adequate before the panel is initialed. All the measurements should be operated with driver IC and FPC mounted.

Parameter	Symbol	Min	Max	Unit	Remark
LC Operating Voltage *1)	V_{OP}		4.5	V	Ta= 25℃
Operating Temperature	T_{OP}	-30	+85	℃	
Storage Temperature	T_{ST}	-40	+90	℃	
Operating Ambient Humidity *2)	H_{OP}	10	*3)	%RH	*3)
Storage Humidity	H_{ST}	10	90	%RH	*3)

Note: **[VSS = GND = 0V]**

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

*2) Temp≤60℃ 90% RH MAX

*3) Non-condensation

2.2 Electrical Characteristics

Recommend Parameters for Electrical Characteristics

Parameter	Symbol	Value	Unit	Remark
		Reference		
TFT Gate ON Voltage	V_{GH}	TBD	V	Note1
TFT Gate OFF Voltage	V_{GL}	TBD	V	Note2
TFT Common Electrode Voltage	V_{COM}	TBD	V	Note3
TFT Kick-Back Voltage Max	ΔVp Max	TBD	V	
TFT Kick-Back Voltage Min	ΔVp Min	TBD	V	

Note:

1. V_{GH} is TFT Gate operating voltage.
2. V_{GL} is TFT Gate operating voltage. The low voltage level of V_{GL} signal must be fluctuate with same phase as V_{com}, the storage capacitance structure of the product is storage on common.
3. V_{com} must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc., We just kindly recommend the setting-voltages the reference value.

In order to get the optimized display quality, the setting-voltage should be changed according to customer's developing condition. (The display quality could be changed by customer's setting –voltage.)

3.0 OPTICAL SPECIFICATIONS

3.1 Overview

The test of Optical specifications shall be measured in a dark room(ambient luminance≤ 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 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.

3.2 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	Θ3	CR>10	70	85		°	Note 1
		Θ9		70	85		°	
	Vertical	Θ12		70	85		°	
		Θ6		70	85		°	
Contrast Ratio		CR	Θ= 0°	800	1000			Note 2
Transmittance		T(%)	Θ= 0°		4.4			Note 3
NTSC		%	Θ= 0°		70%			
Reproduction Of color	Red	Rx	Θ= 0°	0.641	0.656	0.671		Note 4 *.Color filter Glass w/o OC
		Ry		0.312	0.327	0.342		
	Green	Gx		0.273	0.288	0.303		
		Gy		0.578	0.593	0.608		
	Blue	Bx		0.123	0.138	0.153		
		By		0.093	0.108	0.123		
White		Wx	Θ= 0°	0.287	0.302	0.317		
		Wy		0.314	0.329	0.344		
Response Time		Tr+Tf	Θ= 0°		30	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 (see FIG.2).
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 FIG. 2) 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 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 C/F. Measurement condition is C - light source & Halogen Lamp

5. The electro-optical response time measurements shall be made as FIG.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 Tf.

Figure 1. The definition of Vth & Vsat

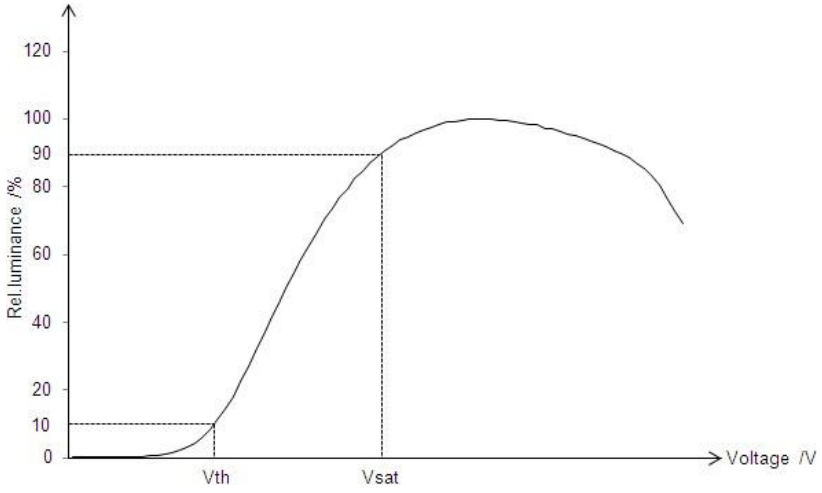


Figure 2. Measurement Set Up

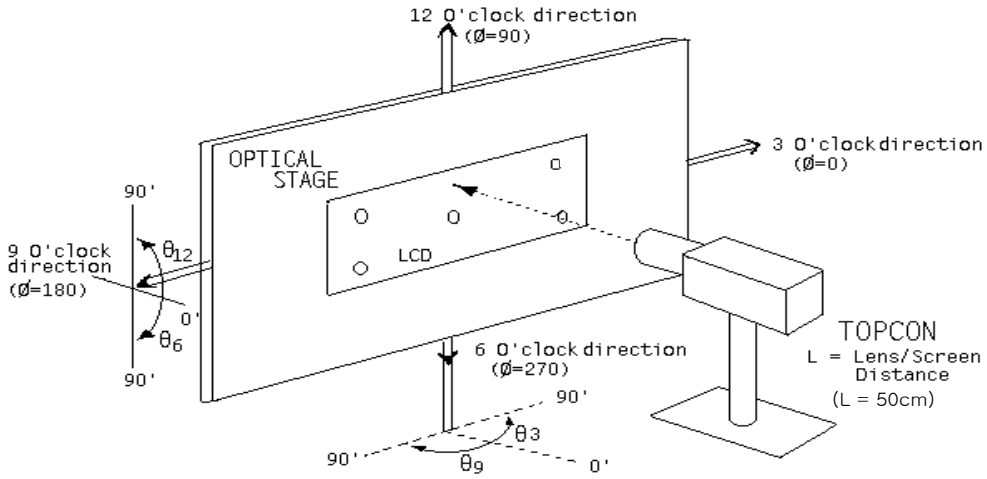
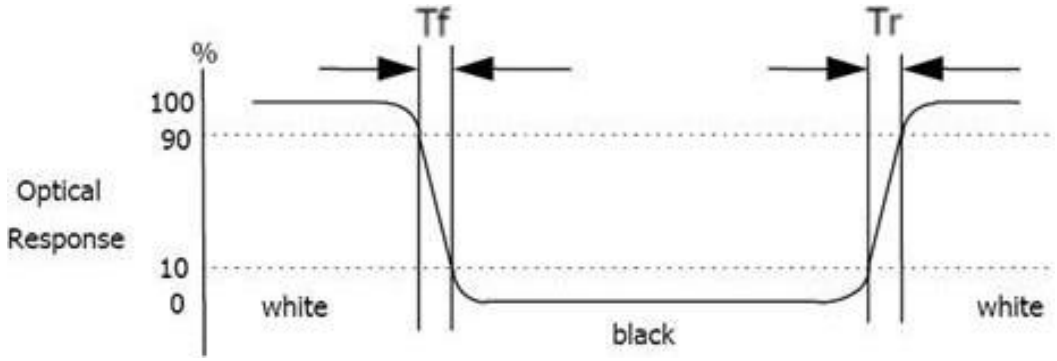


Figure 3. Response Time Testing



4.0 MECHANICAL CHARACTERISTICS

4.1 Dimension Requirements for LCD Part

Mechanical outlines for the panel **(**H: horizontal length, V: Vertical length**)**

Parameter	Specification	Unit	Remark
Panel size	305.4(H) × 124.2(V)	mm	
CF size	300.032(H) × 117.512(V)	mm	
Active area	292.032(H) × 109.512(V)	mm	
Number of pixels	1920(H)RGB × 720(V) (1 pixel = R + G + B dots)	pixels	
Pixel pitch	0.1521(H) × 0.1521(V)	mm	
Pixel arrangement	RGB Vertical Stripe		
Panel ID	1.6 × 10	mm	
COG pad area(G/S)	5.368/ 6.688	mm	
D-IC to FPC distance	0.76	mm	Source
D-IC width(G/S)	0.59/ 1.1	mm	
D-IC to CF edge(G/S)	3.778/ 3.428	mm	
FPC to Glass edge	0.3	mm	Source
FPC width	1.1	mm	Source
Seal Area (U/D/L/R)	4.0/ 4.0/ 4.0/ 4.0	mm	
Dimensional outline	305.4(H) × 124.2(V) × 1.0(D)	mm	Unit Cell
Display mode	Normally Black		

Note:

1. Source pad up.
2. The size specified is calculated by IC–driver Source: HX8298-A, Gate: HX8695-E, the size maybe changed if customer use other IC.

Figure 4. Unit Cell Outline Dimension (unit: mm)

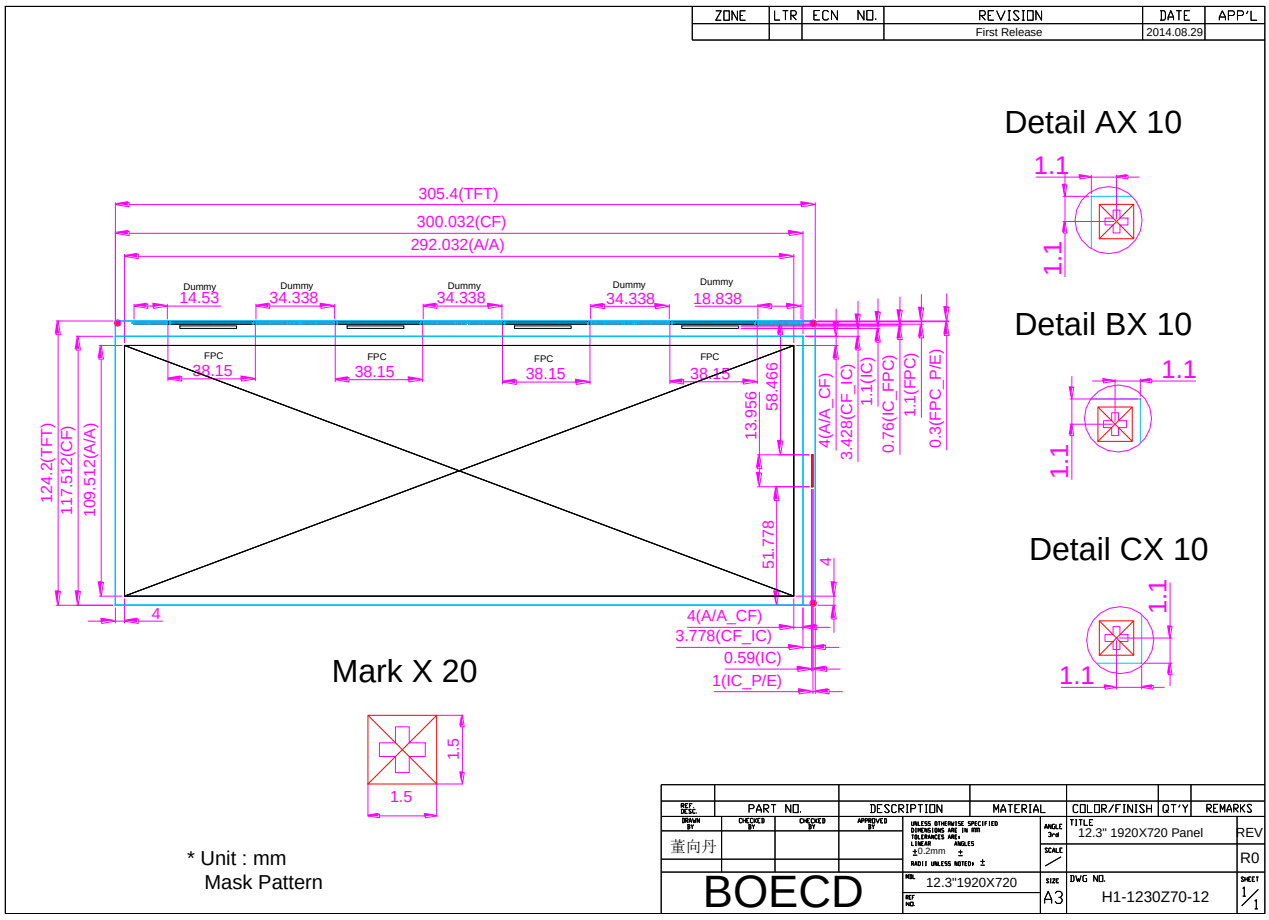
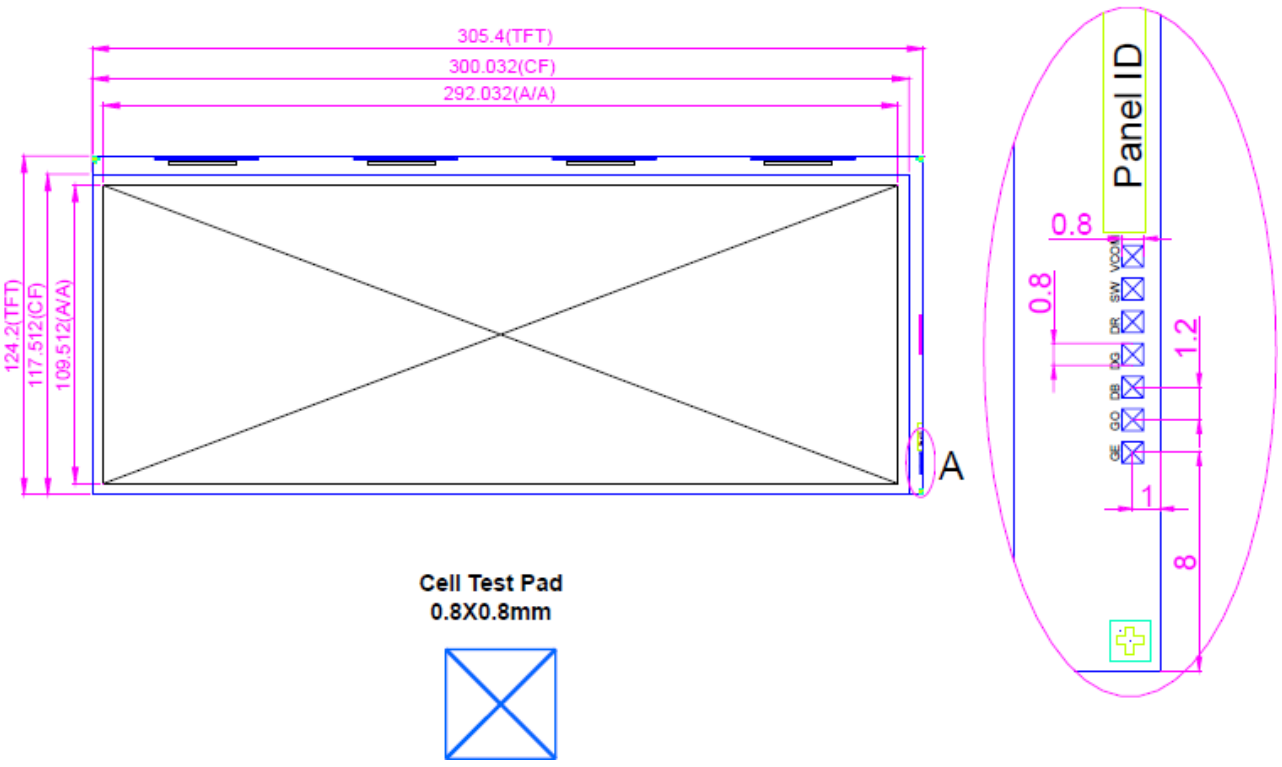
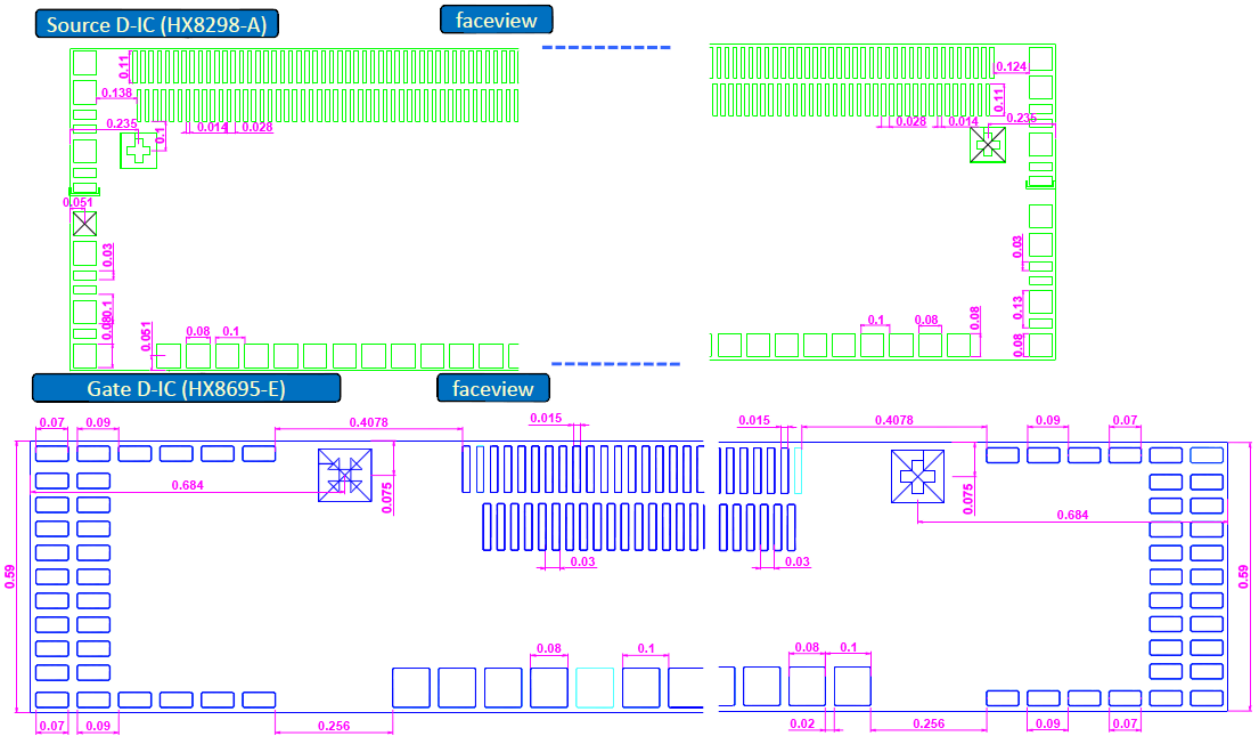


Figure 5. TFT-LCD Panel TEST (unit: mm)

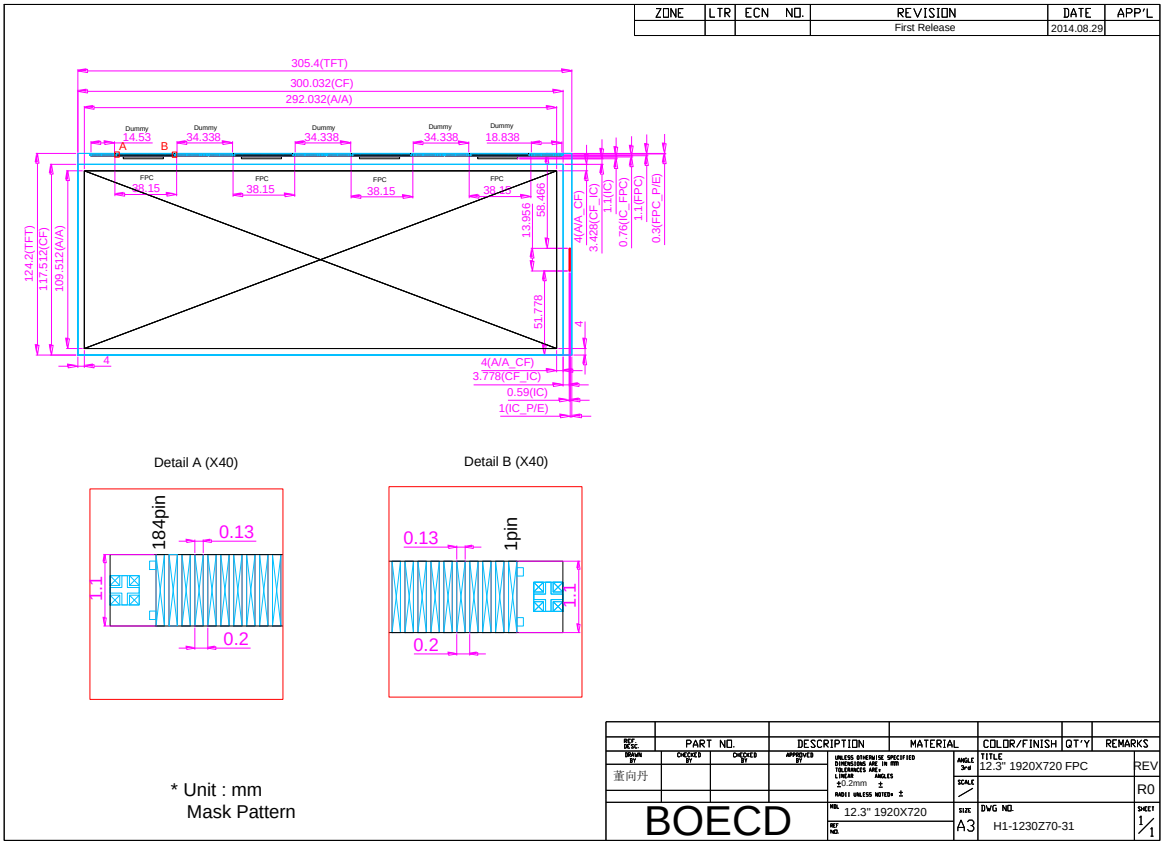


5.0 Gate & Data IC PAD & FPC Pin Assignment

5.1 Gate & Data IC PAD



5.2 FPC Pin Assignments



1	TEST1	38	SOUT2	75	DE	112	D23	149	VSS1
2	TEST2	39	DUMMY	76	VS	113	D22	150	VSSA
3	VCOM	40	VDD_OTP	77	HS	114	VSSIF	151	VSSA
4	VCOM	41	VDD_OTP	78	VSSIF	115	D21	152	VDDN
5	OEPSN	42	THROUGH_2	79	D31	116	D20	153	VDDN
6	SGOFF2	43	THROUGH_2	80	D30	117	VSSIF	154	VDDP
7	SGOFF1	44	VCOM_L	81	VSSIF	118	VDDDIF	155	VDDP
8	VGN	45	VCOM	82	D07	119	VDDD	156	DRVN
9	VSS	46	VCCN	83	D06	120	VDDD	157	DRVN
10	VSS	47	VCCN	84	VSSIF	121	VCC1	158	VCC1P
11	VSS	48	VDDP	85	D05	122	VSS1	159	VCC1P
12	VSS	49	VDDP	86	D04	123	BISTEN	160	DRVP
13	VSS	50	VDDN	87	VSSIF	124	SID1	161	DRVP
14	VSS	51	VDDN	88	D03	125	SID0	162	CL2N
15	VDD	52	VSSA	89	D02	126	SIDEN	163	CL2P
16	VDD	53	VSSA	90	VSSIF	127	TR1	164	CL1N
17	VDD	54	VSS2	91	D01	128	TR0	165	CL1P
18	VDD	55	VSS2	92	D00	129	GSQ	166	VGL
19	VDD	56	VSS1	93	VSSIF	130	FCS	167	VSS1P
20	VDD	57	VSS1	94	D17	131	DINT	168	VGH
21	VGL	58	VCC2	95	D16	132	MODE	169	CH3N
22	VGL	59	VCC2	96	VSSIF	133	NB	170	CH3P
23	VGL	60	VCC1	97	D15	134	RL	171	CH2N
24	VGL	61	VCC1	98	D14	135	TB	172	CH2P
25	VGL	62	TEST0	99	VSSIF	136	INV1	173	CH1N
26	VGL	63	VSS1	100	D13	137	INV0	174	CH1P
27	VGH	64	VSS1	101	D12	138	RS3	175	THROUGH_1
28	VGH	65	VGMPH0	102	VSSIF	139	RS2	176	THROUGH_1
29	VGH	66	VGMPL0	103	D11	140	RS1	177	VCOM_R
30	VGH	67	VGMNL0	104	D10	141	RS0	178	VCOM_R
31	VGH	68	VGMNH0	105	VSSIF	142	GPOS1	179	VGL
32	VGH	69	VGMNHI	106	D27	143	GPOS0	180	VGL
33	DUMMY	70	VGMNLI	107	D26	144	DS	181	GND
34	DUMMY	71	VGMPLI	108	VSSIF	145	CSB	182	GND
35	STV2	72	VGMPHI	109	D25	146	SCL	183	TEST2
36	CPV	73	RESETB	110	D24	147	SDA	184	TEST1
37	OE	74	STBYB	111	VSSIF	148	VSS1		

6.0 RELIABILITY TEST

NO.	Test Item	Test Condition	Duration
1	High temperature, high humidity operation test(THO)	60℃, 90%RH	300hrs
2	Low temperature operation test(LTO)	-30℃	350hrs
3	High temperature operation test(HTO)	85℃	350hrs
4	High temperature storage test(HTS)	90℃	350hrs
5	Low temperature storage test(LTS)	-40℃	350hrs
6	Thermal shock test(TST)	-30℃ → 80℃ (Per 30min)	200cycle
7	Humidity Temperature Cycle(HTC)	-10℃ ~ 60℃,0 ~ 90%RH 10CYCLE	240hrs
8	ESD	150pF 330Ω ±8KV(Air) / ±6KV(Contact)	-

7.0 PACKING METHOD

TBD

8.0 PRODUCT ID RULE

TBD

9.0 HANDDLING & CAUTIONS

9.1 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.

9.2 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.

● 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 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.

9.3 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.

9.4 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

9.5 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.

9.6 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.

9.7 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.

10.0 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.