TITLE :GS089FBB-N10-6HP0 Product Specification Rev.P0

Supplier	ORDOS YUANSHENG Optoelectronics Technology CO., LTD
Model	GS089FBB-N10-6HP0

TITLE/SIGNATURE	DATE

ITEM	SIGNATURE	DATE
Approved		2021.07.21
Reviewed		
Prepared		

ORDOS YUANSHENG OPTOELECTRONICS TECHNOLOGY

REVISION HISTORY

REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0		Initial Release	2021.07.21	Haifeng Bi

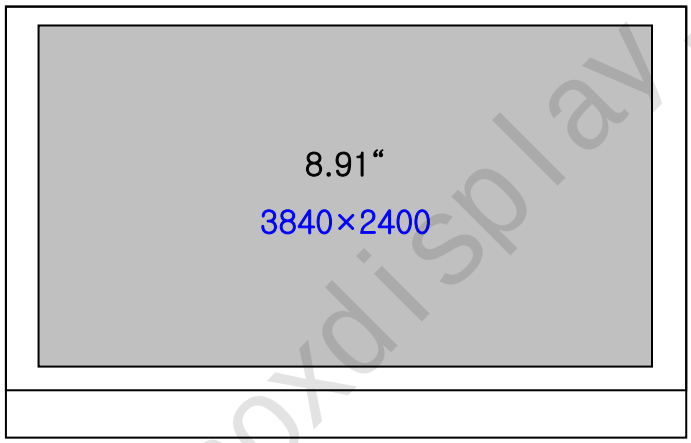
No.	Detail of the Develop Group	Person in Charge
1	PM	Haifeng Bi
2	Array Parts	Aiyu Ding
3	Cell/CF Parts	Min Zhang
4	Circuit Parts	Yutong Chen

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

B6 GS089FBB-N10-6HP0 is a Black & White active matrix LTPS LCD using Low Temperature Poly-silicon TFT‘ s (Thin Film Transistors) as an active switching devices. The LTPS-LCD has a 8.91 inch diagonally measured active area with QHD resolutions (3840 horizontal by 2400 vertical pixel arrays).



1.2 Features

- Border (L/R/U/D)：5.0/5.0/3.0/4.0+6.0
- NTSC：Mono
- Drive IC：ST5892B

1.3 Application

- 3D Print

1.4 General Specification

The followings are general specifications of FOG GS089FBB-N10-6HP0.

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	**192.0(H) x 120.0(V)**	mm	
CF size	**202.0(H) x 127.0(V)**	mm	
Number of pixels	3840(H) × 2400(V)	pixels	
Pixel pitch	**50.0*50.0**	um	
Contrast Ratio	≥300:1 @405nm	-	
Color gamut	Mono	-	
FOG Trans.	6.6	%	不带APF&Haze @405nm
Display mode	Normally black		
Panel Size	**202.0(H) x 133.0(V)**	mm	
IC	ST5892B		

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
LC operating Voltage [1]	V_{OP}	-	5.0	V	Ta=25+/-2°C
Operating Temperature (Humidity)	T_{OP}	-20	+70	℃	
Storage Temperature (Humidity)	T_{ST}	-20	+80	℃	

[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	Value	Unit	Remarks
TFT Gate ON Voltage	VGH	+8	V	
TFT Gate OFF Voltage	VGL	-8	V	
TFT Common Electrode Voltage	VCOM	-0.42	V	
I/O Supply Voltage	IOVCC	3.3	V	
Liquid crystal driver supply voltage	VSP	6	V	
Liquid crystal driver supply voltage	VSN	-6	V	
Frame Frequency	f_Frame	40	Hz	

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 .

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°. 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.
Optimum viewing angle direction is 6 "clock.

4.2 Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	70	80	-	Deg.	
		Θ_9		70	80	-	Deg.	
	Vertical	Θ_{12}		70	80	-	Deg.	
		Θ_6		70	80	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	300	-	-		@405nm
FOG Transmittance		Tr		-	6.6	-	%	不带APF&Haze @405nm
White Chromaticity		x	CIE 1931	0.298	0.308	0.318		CF @ C Light
Color Gamut (C light)				Mono			%	
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C Θ = 0°	-	-	35	ms	

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 4).

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

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

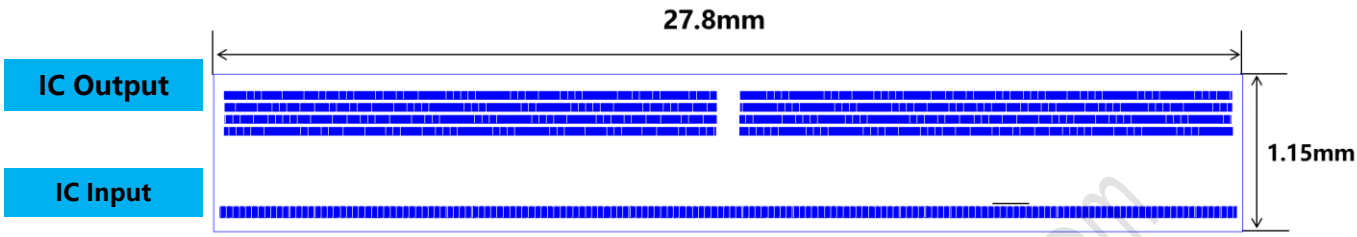
3. Transmittance is the Value with Polarizer

4. The color chromaticity coordinates specified in Table 5 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.

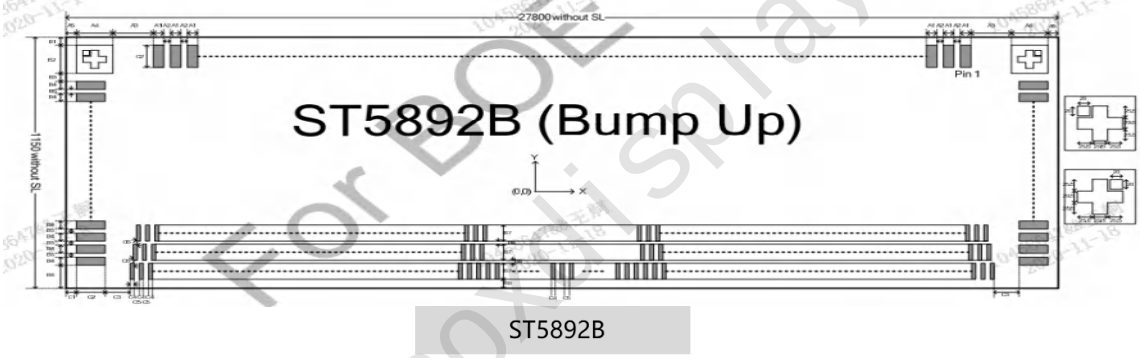
5. The electro-optical response time measurements shall be made as FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

5.0 Data Gate IC Pad & FPC Assignment

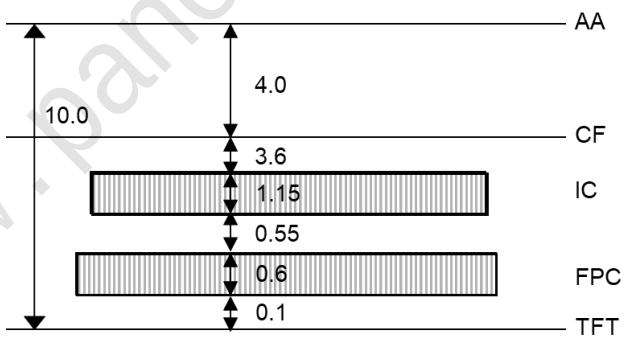
5.1 IC Pin Assignment



Item	Dimension(um)	Item	Dimension(um)	Item	Dimension(um)	Item	Dimension(um)	Item	Dimension(um)
Chip length (x)	27800	A1	40	B1	8	B7	80	C1	20
Chip width (y)	1150	A2	15	B2	140	B8	15	C2	110
Chip thickness	200	A3	92	B3	47	B9	20	C3	82.5
Bump height	12	A4	140	B4	40			C4	15
Linear coefficient (α) of thermal expansion(10⁻⁶/°C)		A5	8	B5	20			C5	21
2.6				B6	75			C6	3



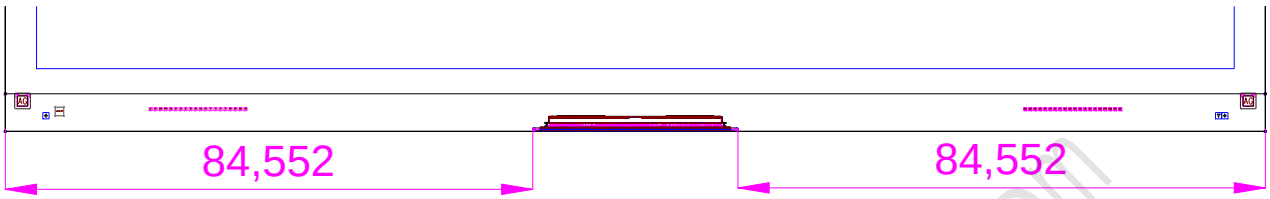
ST5892B

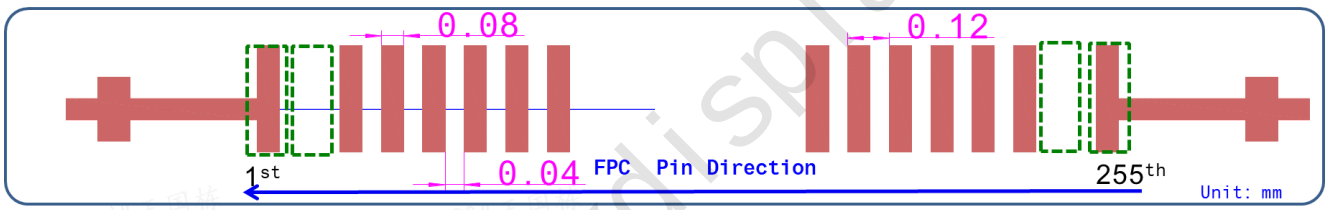


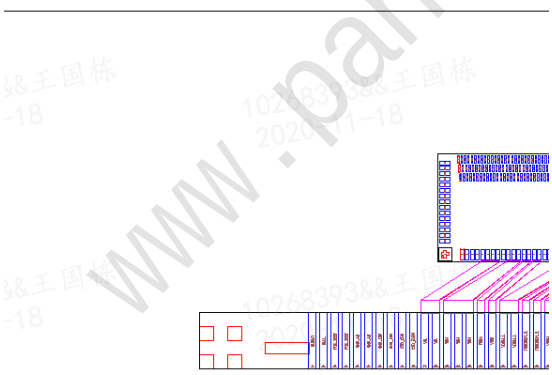
Item	Lead Length	Lead Width	Space	Pitch
IC Output	80 um	15 um	21 um	36 um
IC Input	110 um	40 um	15 um	55 um
Remark	-	-	-	-

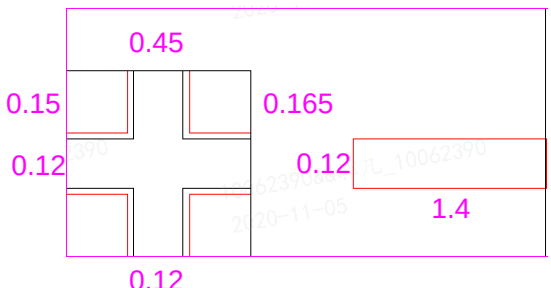
Size : um

5-2. FPC Pin Assignment









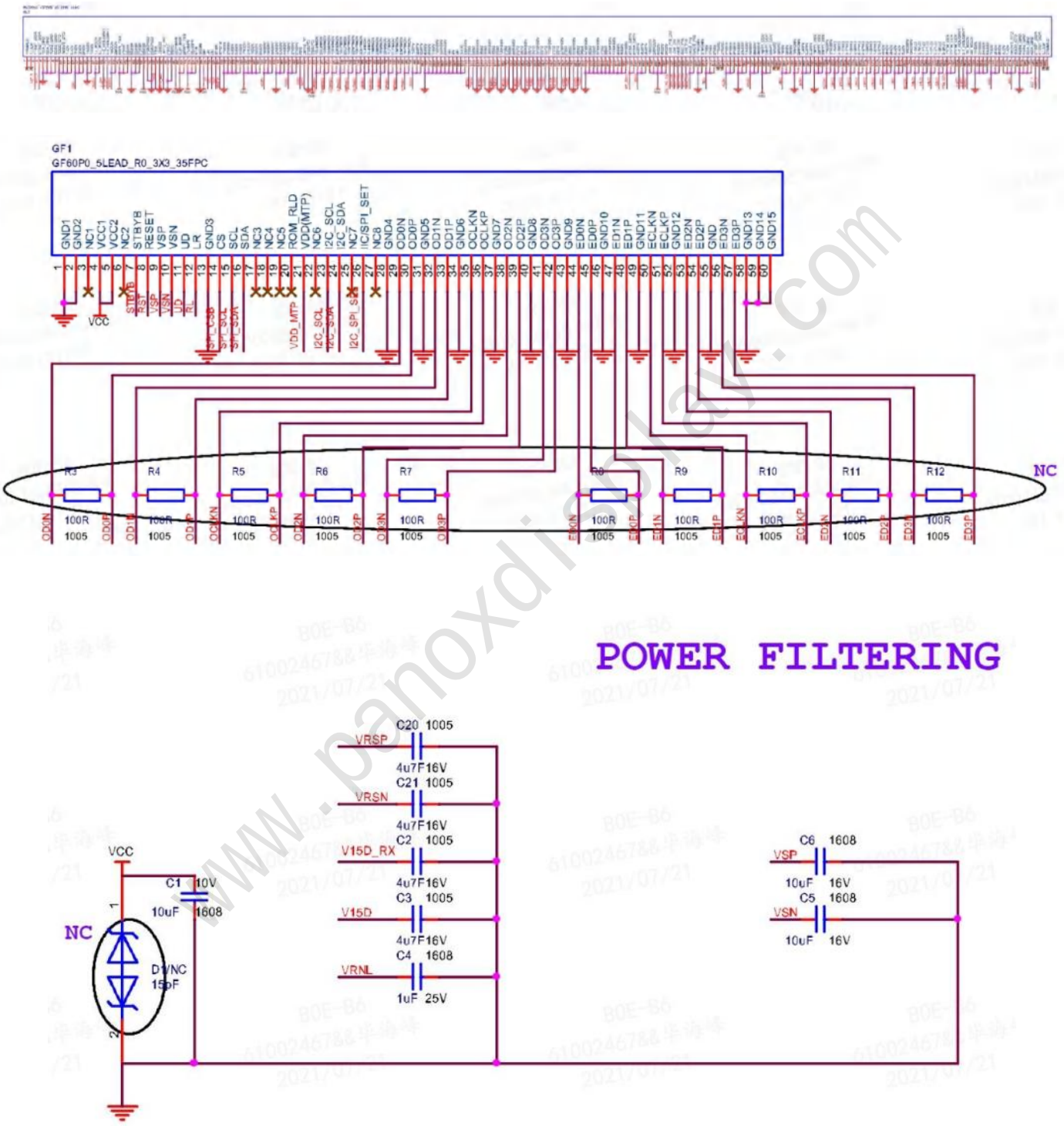
FPC Mark

FPC Size: 32.896 * 0.6 mm

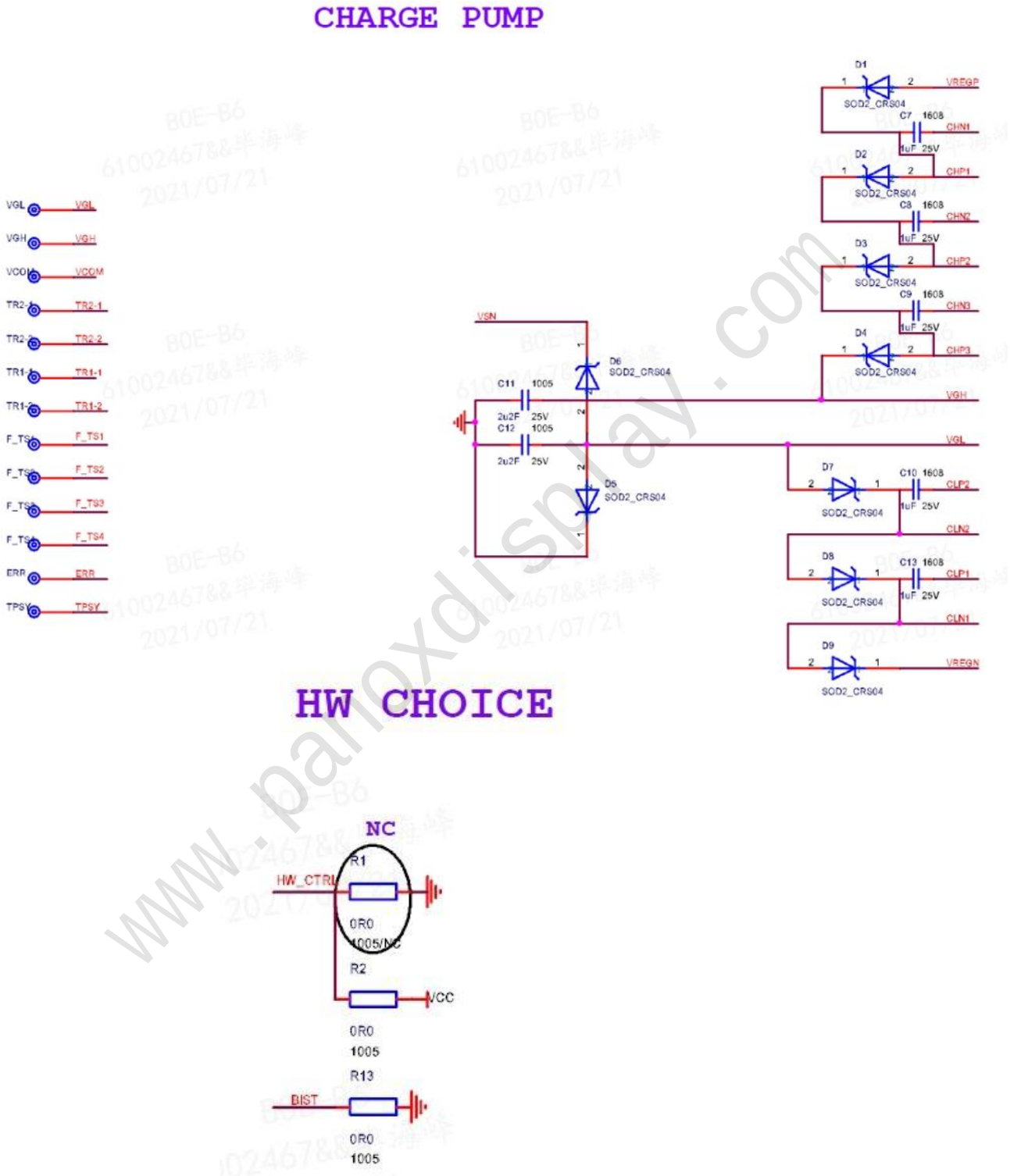
5-4. FPC Pin Map

Pin No.	Pin Name	Pin Description	Pin No.	Pin Name	Pin Description
1	GND	ground	31	GND	ground
2	GND	ground	32	OD1N	- LVDS differential data 1 (ODD)
3	NC	Not connect	33	OD1P	+ LVDS differential data 1 (ODD)
4	VCC	Power +3.3V	34	GND	ground
5	VCC	Power +3.3V	35	OCLKN	- LVDS differential clock (ODD)
6	NC	Not connect	36	OCLKP	+ LVDS differential clock (ODD)
7	STBYB	Standby mode	37	GND	ground
8	RESET	Reset Pin. Low active	38	OD2N	- LVDS differential data 2 (ODD)
9	VSP	VSP	39	OD2P	+ LVDS differential data 2 (ODD)
10	VSN	VSN	40	GND	ground
11	UD	Gate output shift vertical direction select	41	OD3N	- LVDS differential data 3(ODD)
12	LR	Source output shift horizo ntal direction select	42	OD3P	+ LVDS differential data 3 (ODD)
13	GND	ground	43	GND	ground
14	CS	Chip select signal for SPI interface	44	ED0N	- LVDS differential data 0 (EVEN)
15	SCL	Clock signal for SPI interf ace	45	ED0P	+ LVDS differential data 0 (EVEN)
16	SDA	Serial address and data i nput/output for spi	46	GND	ground
17	NC	Not connect	47	ED1N	- LVDS differential data 1 (EVEN)
18	NC	Not connect	48	ED1P	+ LVDS differential data 1 (EVEN)
19	NC	Not connect	49	GND	ground
20	ROM_RLD	MTP reload per 30 frame s(NO CONNECT)	50	ECLKN	- LVDS differential clock (EVEN)
21	VDD(MTP)	Power supply for MTP cir cuit	51	ECLKP	+ LVDS differential clock (EVEN)
22	NC	Not connect	52	GND	ground
23	I2C_SCL	Not connect	53	ED2N	- LVDS differential data 2 (EVEN)
24	I2C_SDA	ground	54	ED2P	+ LVDS differential data 2 (EVEN)
25	NC	Not connect	55	GND	ground
26	IIC/SPI_SE T	Serial interface selection	56	ED3N	- LVDS differential data 3 (EVEN)
27	NC	Not connect	57	ED3P	+ LVDS differential data 3 (EVEN)
28	GND	ground	58	GND	ground
29	OD0N	- LVDS differential data 0 (ODD)	59	GND	ground
30	OD0P	+ LVDS differential data 0 (ODD)	60	GND	ground

5-5.Schematic Design



5-5.Schematic Design

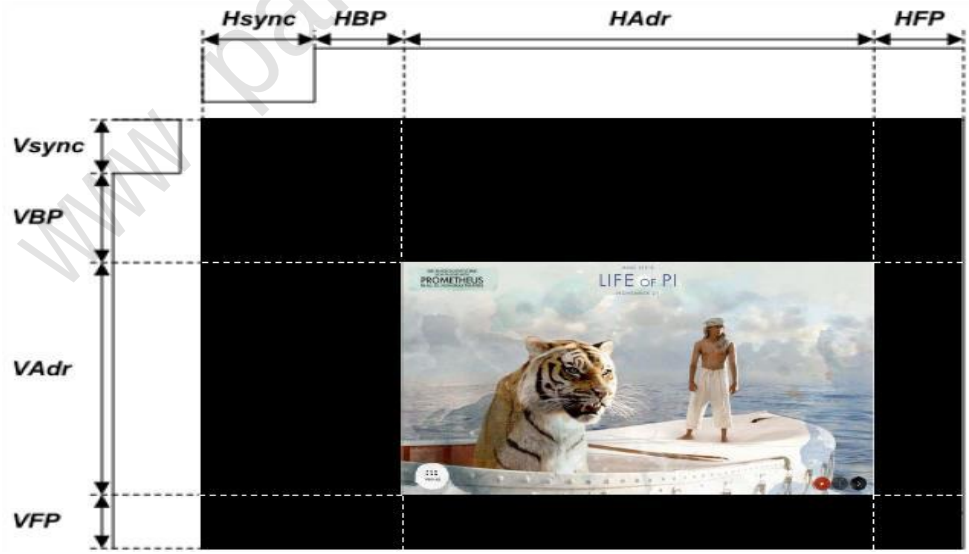


3.6 Interface timing Parameter

< Table12. Timing Parameter >

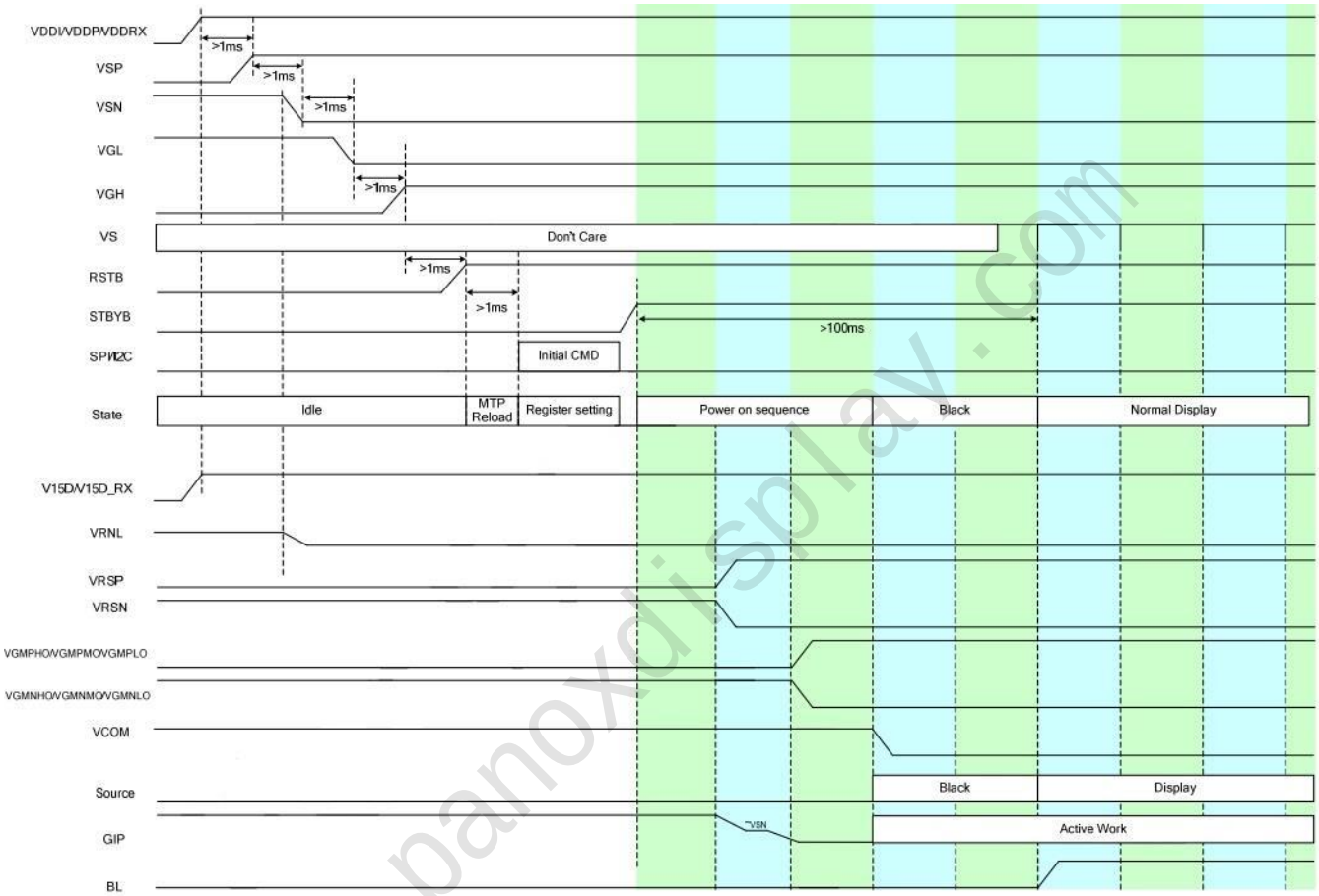
Item			Symbol	min	typ	max	UNIT
LCD	Frame Rate		-	-	40	-	Hz
Timing	DCLK	Frequency	fCLK	67	72	84	MHz
	Horizontal	Horizontal total time	tHP	692	730	830	t_{CLK}
		Horizontal Active time	tHadr	640			t_{CLK}
		Horizontal Pulse Width	tHsync	2	20	30	t_{CLK}
		Horizontal Back Porch	tHBP	20	30	80	t_{CLK}
		Horizontal Front Porch	tHFP	30	40	80	t_{CLK}
	Vertical	Vertical total time	tvp	2422	2450	2520	t_H
		Vertical Active time	tVadr	2400			t_H
		Vertical Pulse Width	tVsync	2	10	20	t_H
		Vertical Back Porch	tVBP	10	20	50	t_H
		Vertical Front Porch	tVFP	10	20	50	t_H

Remarks : 1.This production is 2port
2.The production transmission diagram is 1280RGBx2400

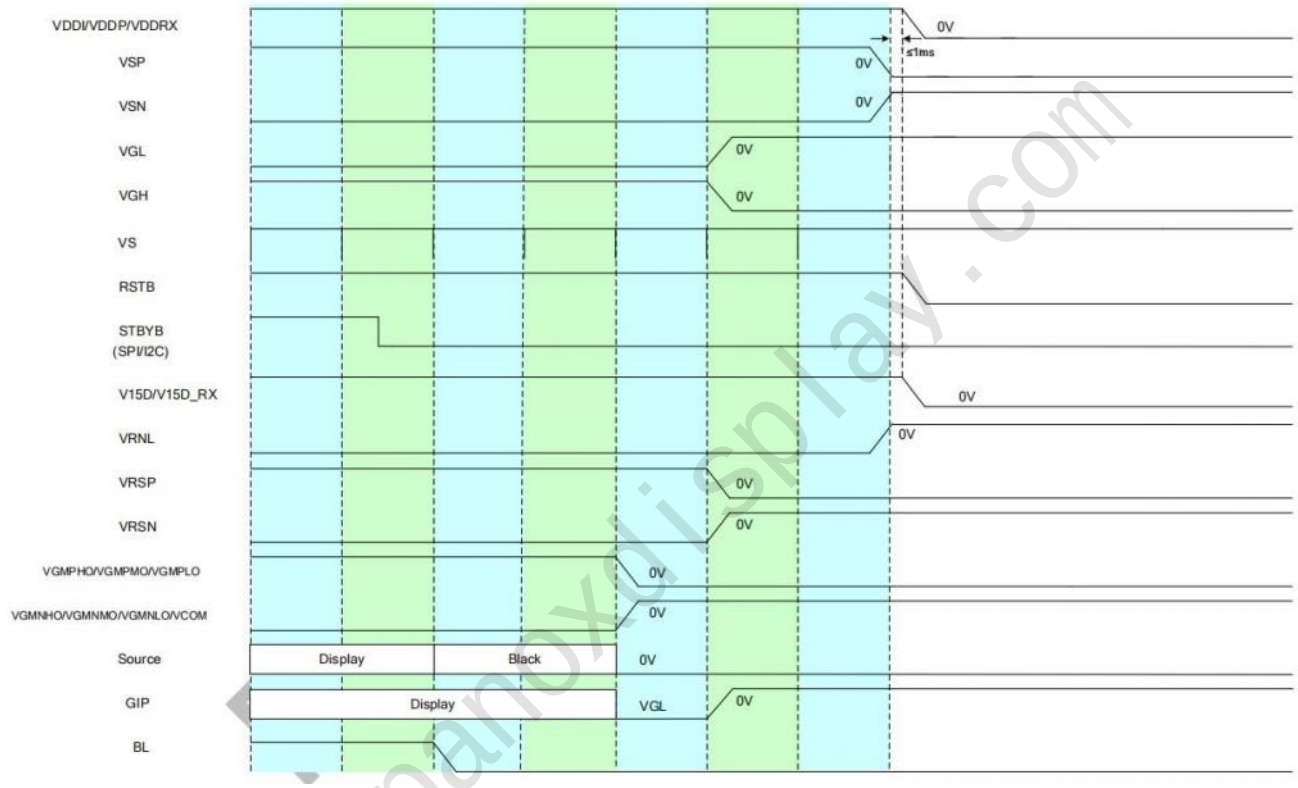


3.8 Power Sequence

Power on

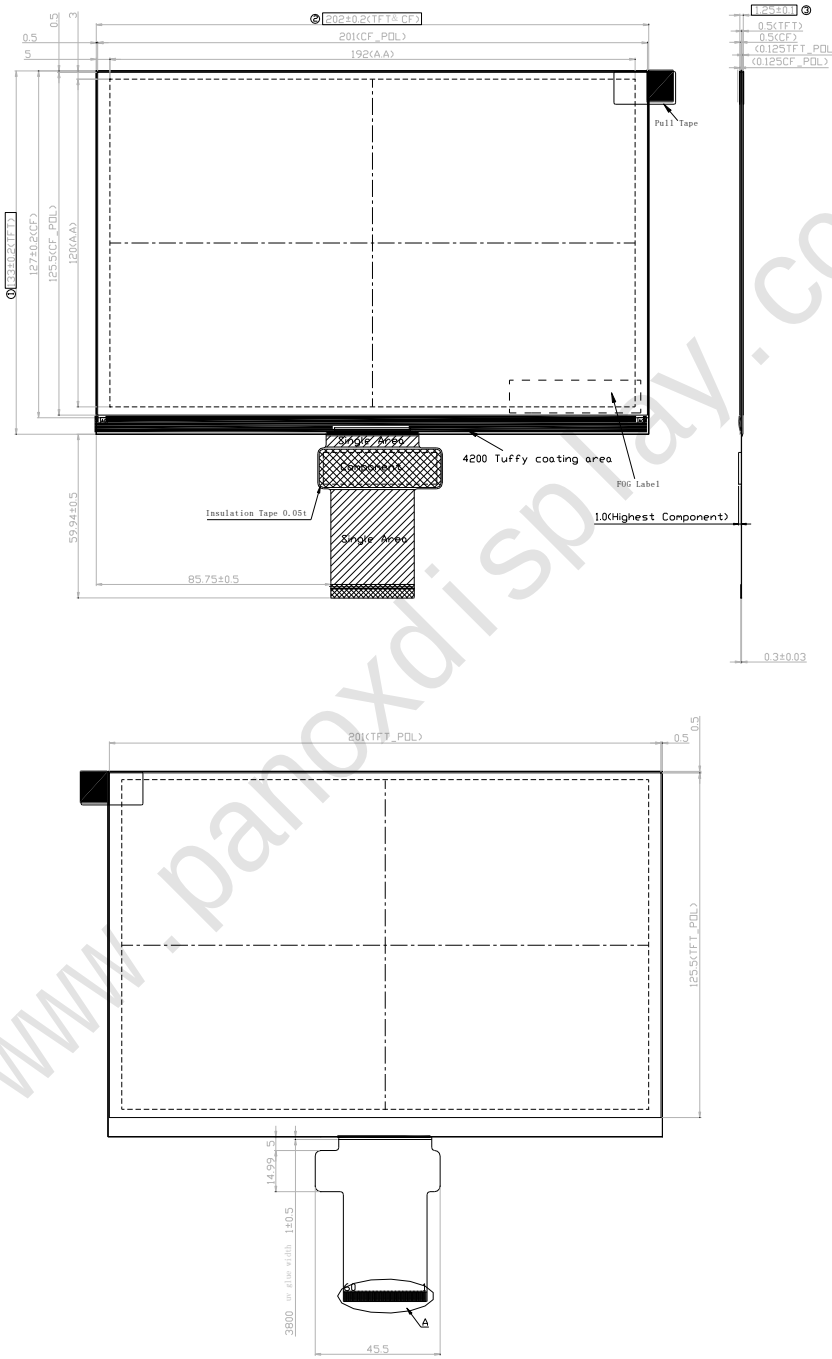


Power off



Mechanical Drawing

Drawing Attachment:



7.0 APPENDIX

Figure 1. Optical Test Equipment Setup

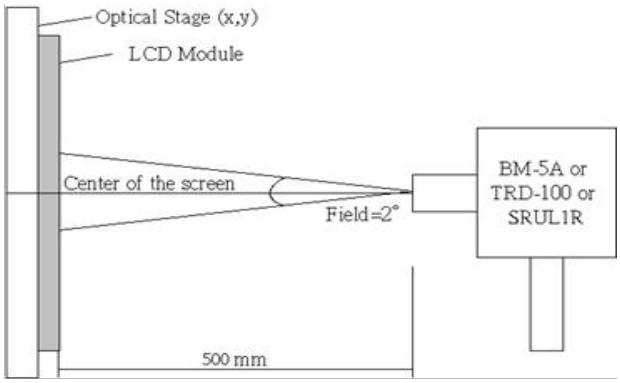


Figure 2. Response Time Testing

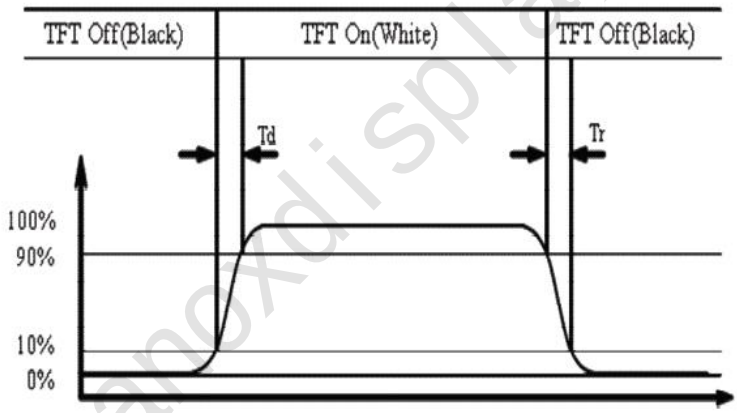


Figure 3. The Definition of Vth & Vsat

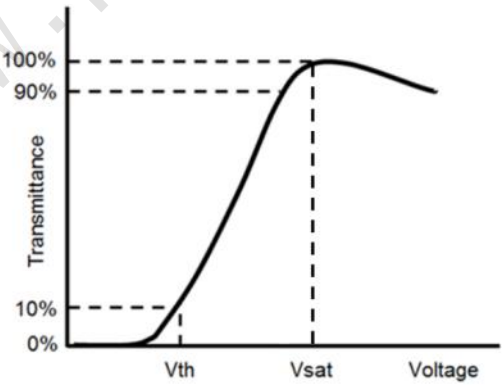


Figure 4. Viewing Angle Range is defined as follows;

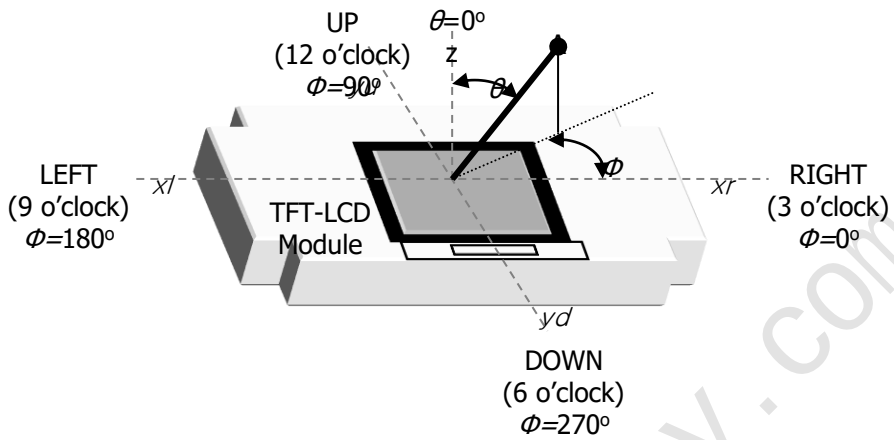
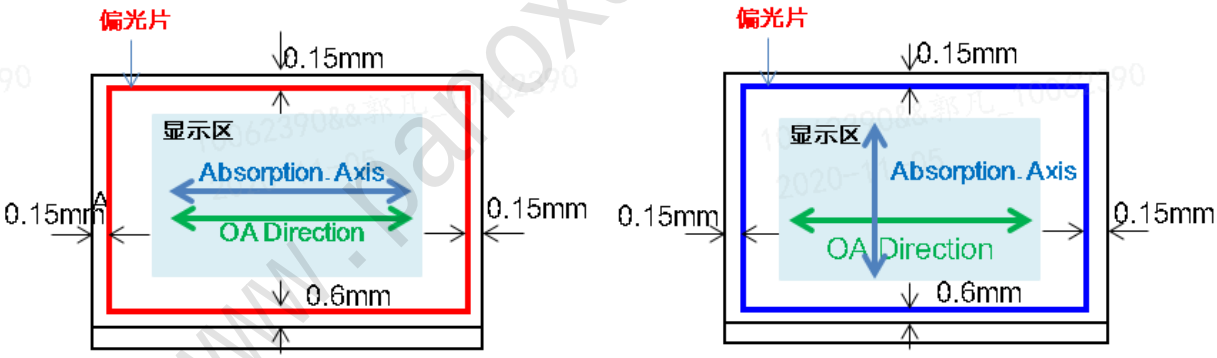


Figure 5. Pol General Spec

UP POL **DOWN POL**



	CF Pol	TFT Pol	Remark
Absorption. Axis	0˚±0.5˚	90˚±0.5˚	住化\日东

8.0 RELIABILITY TEST

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

<Table 8. Reliability test>

No	Test Items	Conditions
1	High temperature storage test	Ta = 80 ℃, 240 hrs
2	Low temperature storage test	Ta = -20℃, 240hrs
3	High temperature & high humidity operation test	Ta = 60 ℃, 90%RH, 240hrs
4	High temperature operation test	Ta = 70 ℃, 240 hrs
5	Low temperature operation test	Ta = -20 ℃, 240hrs
6	Thermal shock test	Ta = -20 ℃ ↔ 80 ℃ (30min), 100cycle

9 Handling & Cautions

9.1 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.
- Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD for incoming inspection or assembly.
- This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

9 Handling & Cautions

9.2 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.
- Please use suction cup to grab the Q-Panel. Please use suction ball to grab the Cell. It is forbidden to touch the ITO pad area and Active Area.
- Repeatedly bonding will result in film peeling.
- The special tray should be used to avoid Q-panel bending while the placement,flipping,etc.
- When the LCD needs to be returned,please use special tray.
- When disposing LCD, obey the local environmental regulations.
- The ion wind blowing is the unique way to clean ITO pad area. No wipe.
- The LCD should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

9.3 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.
- To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

9.4 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.
- The ET standard timing is required. Abnormal power-down will cause jitter.

9.5 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.

9.6 Storage

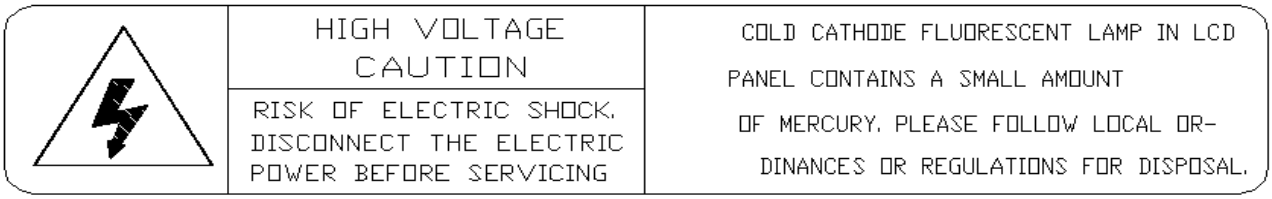
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Relative humidity of the environment should therefore be kept below 60%RH.
- Original protective film should be used on LCD's surface (polarizer). Adhesive type protective film should be 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(25±10℃).
  -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.
  -The LCD should be stored in the room without acid, alkali and harmful gas.

9.7 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.

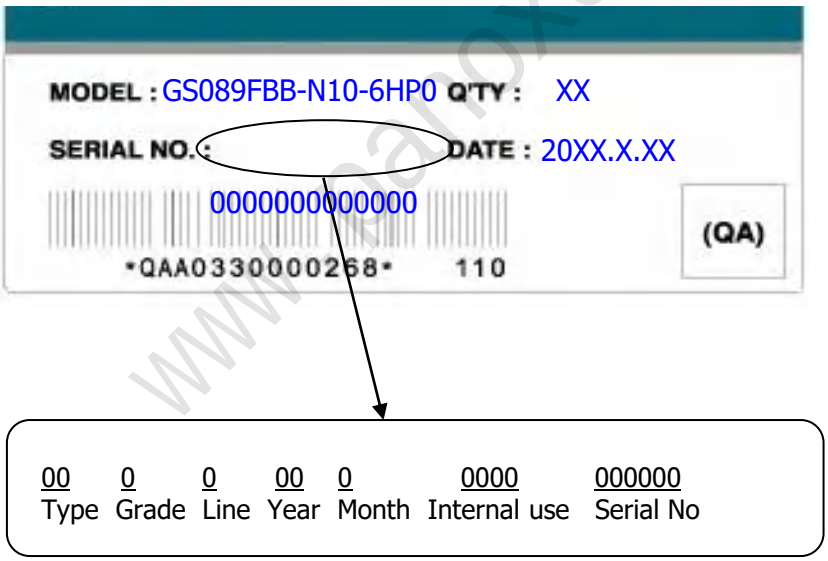
10.0 LABEL

(1) High voltage caution label

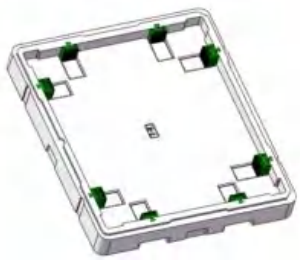
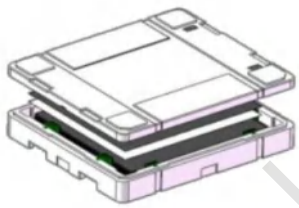
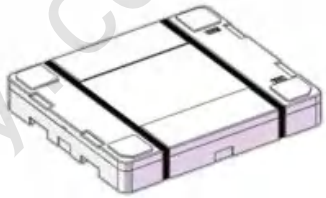
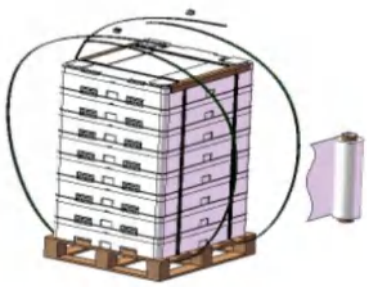
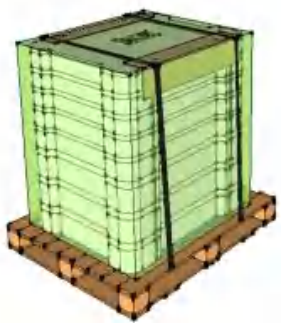


(2) Box label

Label Size: 110 mm (L) 56 mm (W)
Contents
Model: GS043FHB-N10-DHP0
Q`ty: Cell Q`ty in one box
Serial No.: Box Serial No. See next figure for detail description.
Date: Packing Date
Internal use of Product



10.1 PACKING INFORMATION

参照Box 挡块匹配图，正确将ABS挡块放到EPO Bottom的相应位置	将20ea Q依次平放入, 每个Q上下均放置珍珠棉垫片，共计21pcs，最后盖上EPO Cover	利用绑带沿着凹槽将Cover与Bottom捆绑打包。 20 Q-Panel/EPO Box
 Step1	 Step2	 Step3
将BOX堆叠在栈板上； 最大堆叠箱数：8 BOX/栈板（通常陆运8BOX，空运2BOX） 8 EPO Box/Pallet	在最上方BOX的长边侧放纸护角，打绑带并用打包扣扣紧，缠缠绕膜（2层/BOX），顶部加盖缠绕膜160 Q-Panel/Pallet	整托入库 陆运：≤8BOX（160片Q） 空运： ≤2BOX（40片Q）
 Step4	 Step5	 Step6