Specification
For
Approval

□ Preliminary specification
■ Final specification

Title	5.8HD768 TN TFT-LCD (FOG)

Buyer	
Model	

Supplier	Cheng Du BOE Optoelectronics Technology CO.LTD
Model	ET058Z8B-NE0

TITLE/SIGNATURE	DATE

Please return one copy confirmation with signature and your comments

ITEM	SIGNATURE/DATE
Approved	
Reviewed	
Prepared	

BOE CHENG DU
Optoelectronics Technology CO., LTD

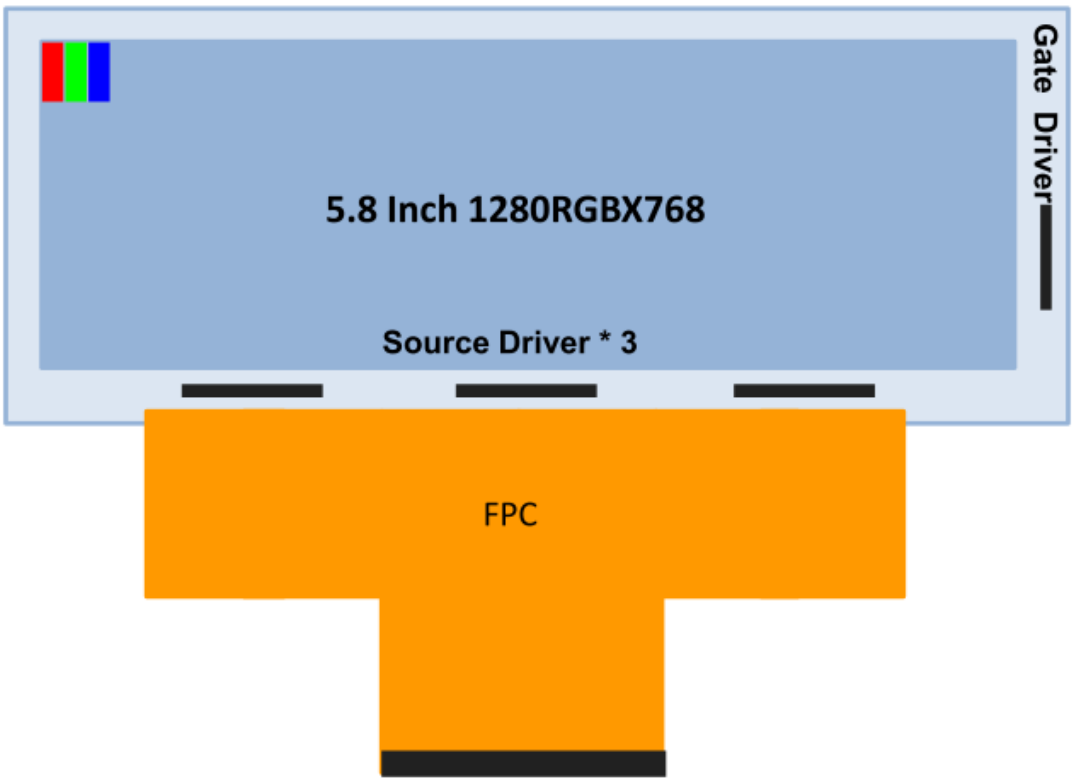
CONTENT LIST

Record of Revisions				
Revision	Date	Page	Description	Released by
Rev.0	2015.6.23	P17	Initial Released	wanghengruo
Rev.1	2015.7.29	P8	2.3 Power Consumption数据更新	wanghengruo

1.0 GENERAL DESCRIPTION

1.1 Introduction

ET058Z8B-NE0 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 white. This TFT-LCD has a 5.8 inch diagonally measured active area with HD resolutions (1280 horizontal by 768 vertical pixel array). Each pixel is divided into Red, Green, Blue dots and this panel can display 262K colors.



1.2 Features

- 0.5t single glass
- FOG Design
- TN, High luminance and contrast ratio, low reflection
- RoHS Compliant

1.3 Application

- Projector

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

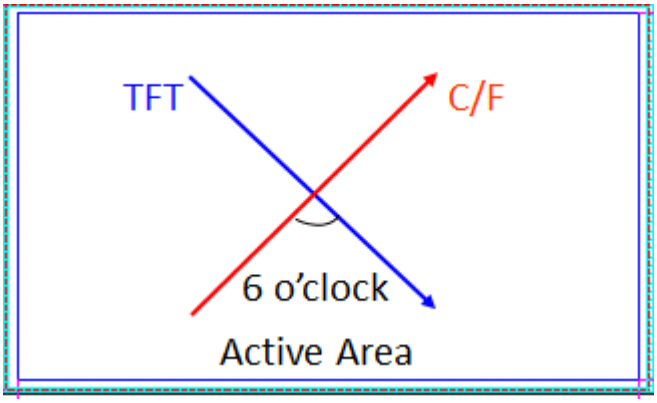
1.4.1 Physical Specifications

Parameter	Specification	Unit	Remark
Active Area	126.72(H) × 74.88(V)	mm	
Number of Pixels	1280(H) RGB ×768(V)	pixels	
Pixel Pitch	0.0990(H) ×0.0975(V)	mm	
Pixel Arrangement	RGB Vertical stripe		
Display Colors	262K	colors	
Color Gamut	40%(typ.)		
Display Mode	TN, Normally white		
Dimensional Outline	137.488±0.3(H)×84.70±0.30(V)×1.315±0.2(D)	mm	FOG
Polarizer Surface treatment	Up POL:HC; Down POL:Clear		
Polarizer compensation type	-		
Viewing Direction(Human Eye)	12 o'clock		Note 1
D-IC	Source IC HX8286-A-LT*3 gate IC HX8695－E*1		Note 2
Weight	TBD	gram	

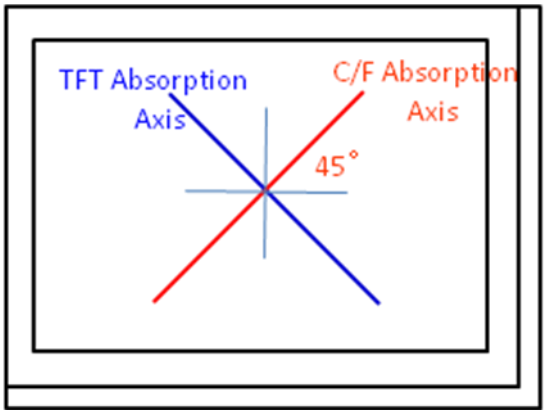
Note:

1.Gray Scale inversion Direction:6 o'clock.

2.The TFT and CF LC Align Direction.



3.The TFT and CF Pol Obsorption direction;



4.These data of Product Specification were based on Source IC HX8286-A-LT*3 gate IC HX8695－E*1, if Customer want to use compatible IC, Please contact our technic personnel.

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}	3.8	5.2	V	Ta= 25℃
Operating Temperature	T_{OP}	-20	+70	℃	
Storage Temperature	T_{ST}	-30	+80	℃	
Operating Ambient Humidity *2)	Hop	10	*3)	%RH	*3)
Storage Humidity	Hst	10	*3)	%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 DC characteristics

GND=0V, VDD=3.3V, Ta = 25℃

Item		Symbol	MIN	TYP	MAX	Uni	Remar
Logic Supply Voltage		VDD	2.8	3.3	3.6	tV	k
Input Signal Voltage	High Level	VIH	0.7*VDD	-	VDD	V	
	Low Level	VIL	0	-	0.3*VDD	V	
Output Signal Voltage	High Level	VOH	VDD-0.4	-	VDD	V	
	Low Level	VOL	0	-	0.4	V	
Mini-LVDS	High Level	VIHLVDS	200	-	400	mV	
	Low Level	VILLVDS	-200	-	400	mV	
	Com Level	VCMLVDS	GND+0.8	1.2	VDD-1.5	V	
Logic Supply Voltage		AVDD	10.5	(12.5)	(13)	V	
		VGH	14	(15)	(21.0)	V	
		VGL	(-12)	(-10.7)	-8	V	
		Vcom	(3.4)	4.6	(5.5)	V	
Power Consumption		Black Mode	-	TBD	-	m W	

2.3 Power Consumption

Parameter	Symbol	Typ	Max	Unit	Remark
Normal mode	I_{VCC}	19	25	mA	
	I_{VGH}	102	122	uA	
	I_{VGL}	100	120	uA	
	I_{AVDD}	75.5	100	mA	

Note:

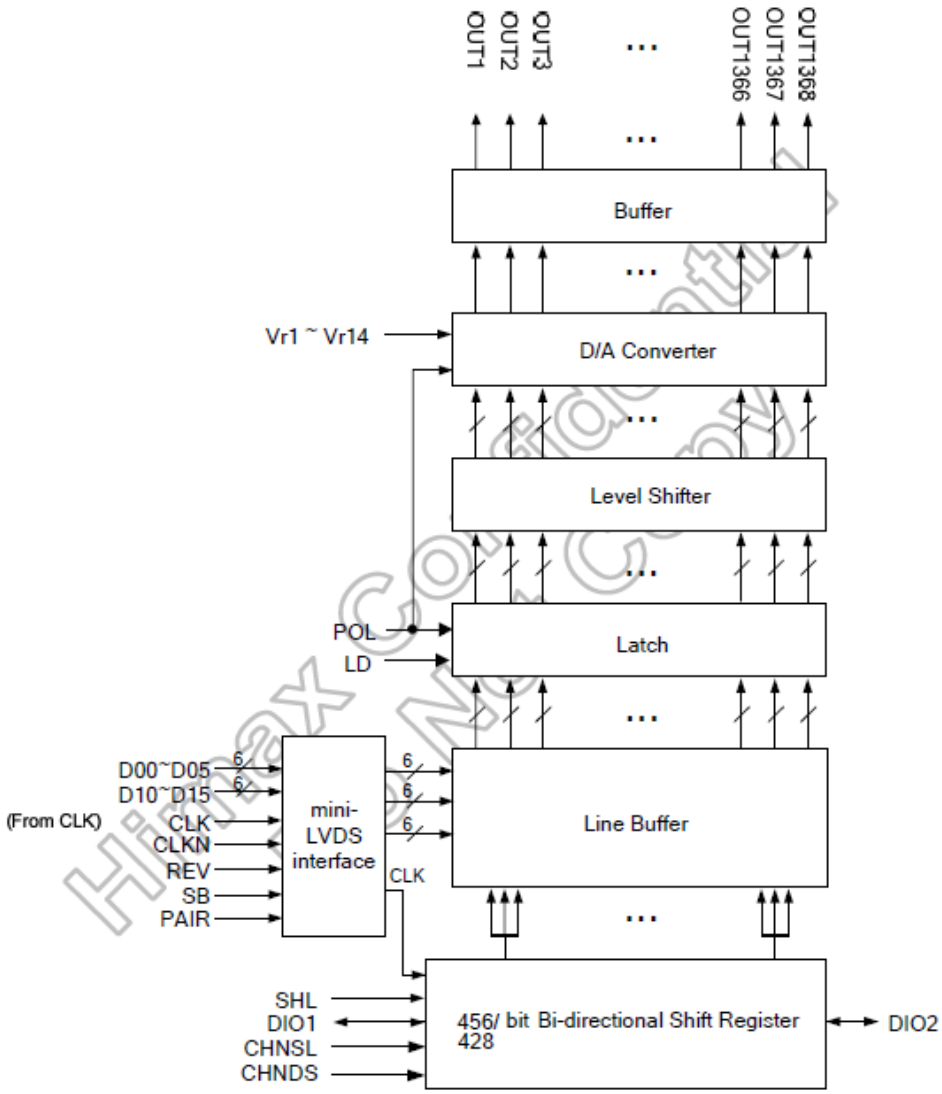
Frame rate=60HZ, Color bar pattern, 25℃

2.4 Gamma

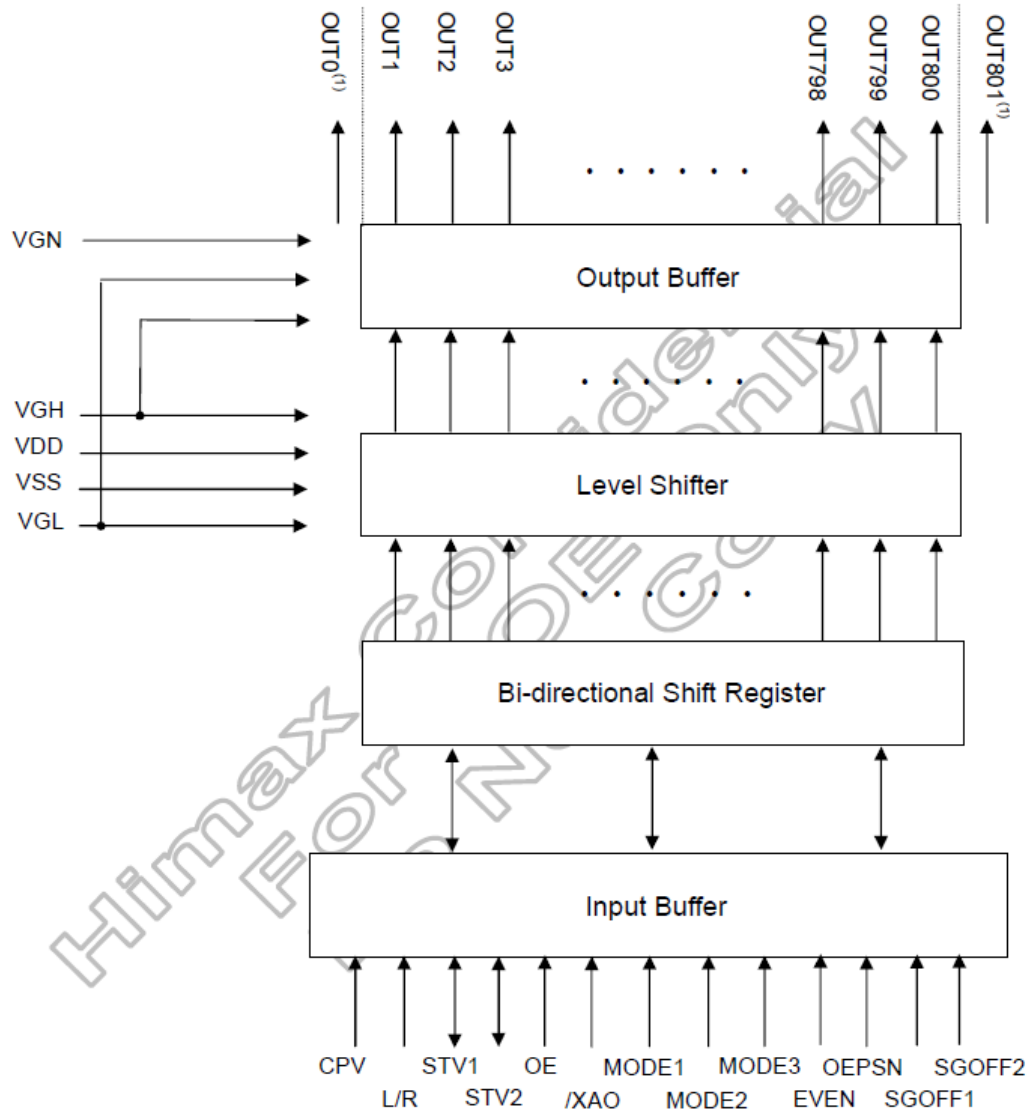
Gamma resistance (Ω)	Gamma voltage(V)	
connect to AVDD		
107.0	V1	11.486
57.6	V2	10.93
270.0	V3	8.27
43.2	V4	7.84
24.0	V5	7.6
24.0	V6	7.36
20.0	V7	7.16
154.0	V8	5.61
44.2	V9	5.18
82.5	V10	4.36
36.0	V11	4
54.9	V12	3.46
147.0	V13	2
133.0	V14	0.75
75.0		
Connect to GND		

2.5 Block Diagram

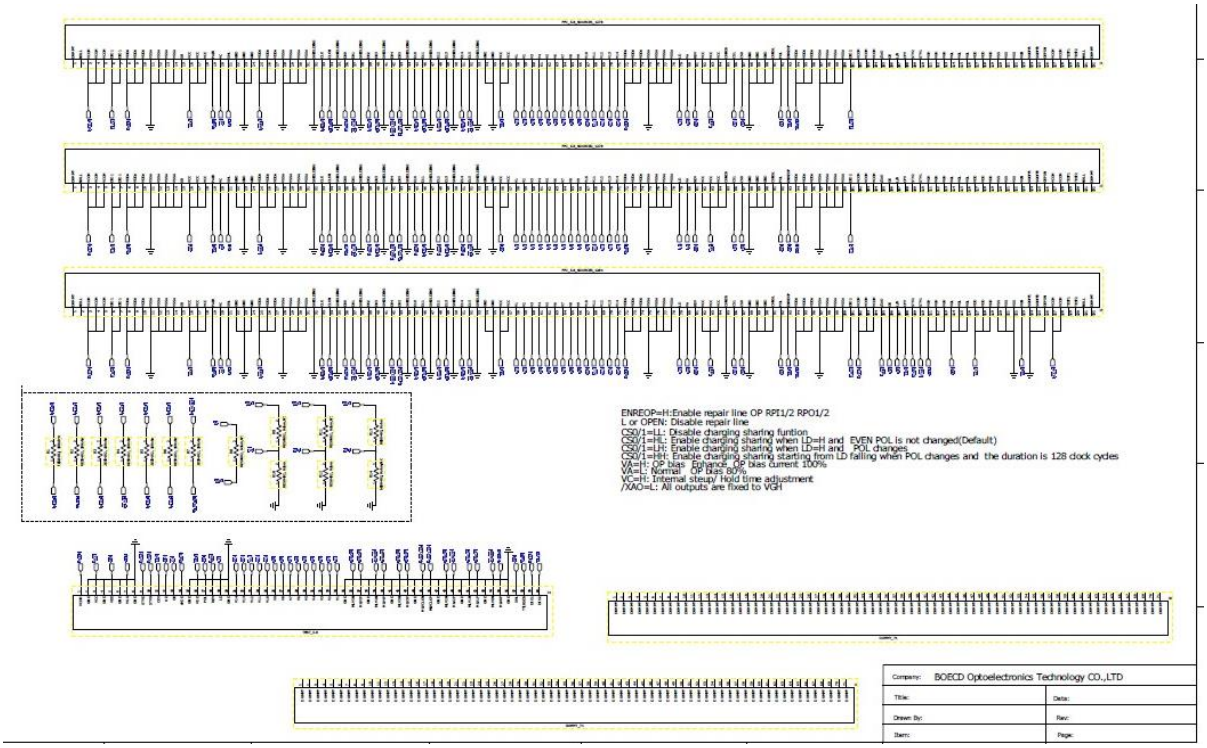
HX8286


OUT1
OUT2
OUT3
OUT1366
OUT1367
OUT1368
Buffer
Vr1 ~ Vr14
D/A Converter
Level Shifter
POL
LD
Latch
D00~D05
D10~D15
(From CLK)
CLK
CLKN
REV
SB
PAIR
mini-
LVDS
interface
Line Buffer
SHL
DIO1
CHNSL
CHNDS
456/ bit Bi-directional Shift Register
428
DIO2

HX8695



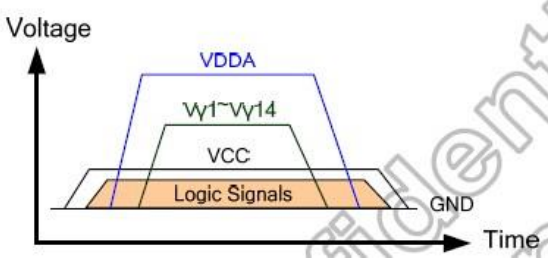
2.6 FPC Schematic



3.0 SIGNAL TIMING SPECIFICATION

Power on/off sequence (HX8286)

This IC is a high-voltage LCD driver, so may be damaged by a large current flow when an incorrect power sequence is used. The recommended sequence should be: digital power (VCC&GND) logic signals, analog power (VDDA&VSSA) Gamma correction reference voltage ($V_{\gamma1}$~$V_{\gamma14}$). Reverse this sequence to shut down, or turn off all signals and power simultaneously.



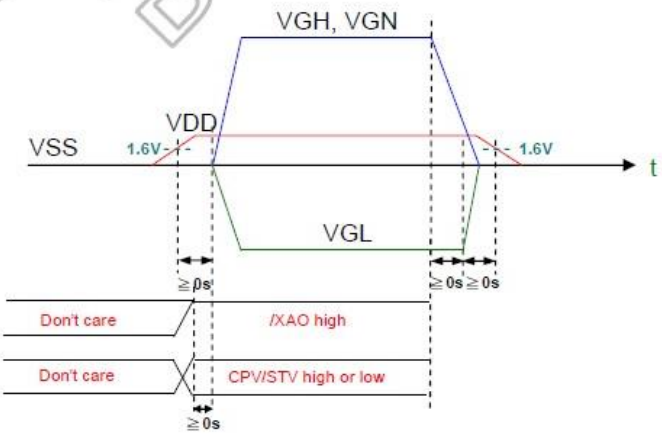
Power on/off sequence (HX8695)

The power on/off sequence need be followed as shown below.

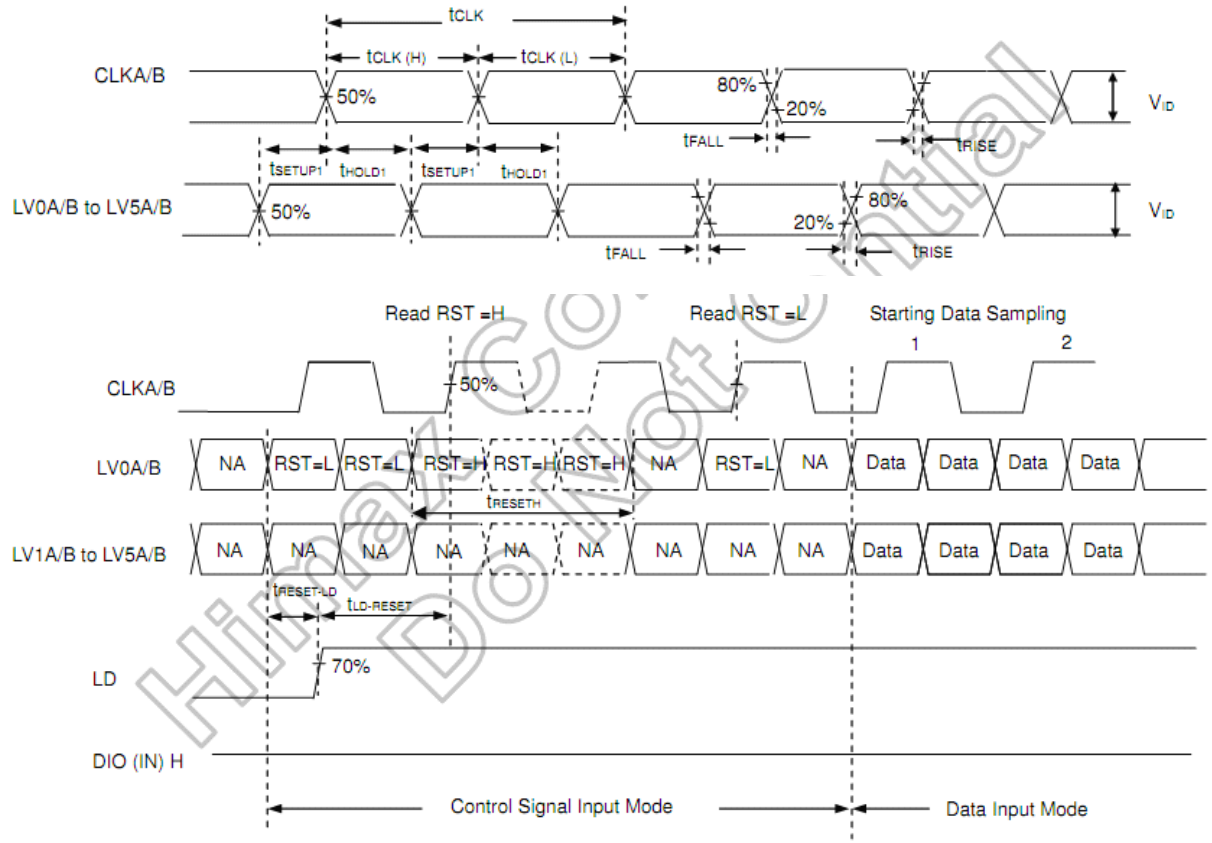
When power on, VGH/VGL can start to be turned on after VDD reaches 1.6V. When VGH/VGL start to be turned on, CPV and STV should be not floating, and /XAO should be at VDD level or floating. The other control signals have no timing limitation.

When power off, VGH/VGL must start to be turned off before VDD drops to 1.6V. If the possible power off image residue is not concerned or the backlight is turned off in advance to shadow the possible image residue, there is no power off sequence limitation.

Power on: VDD→VGH, VGN/VGL
Power off: VGH, VGN→VGL→VDD

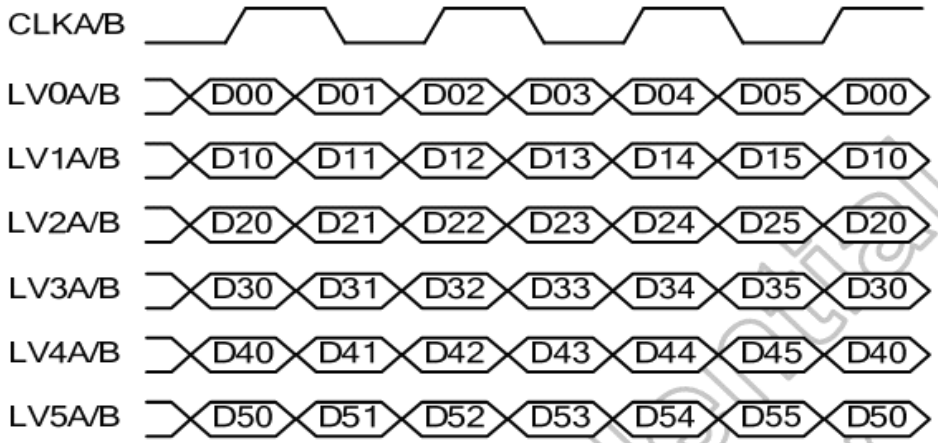


Timing for receiving data 1

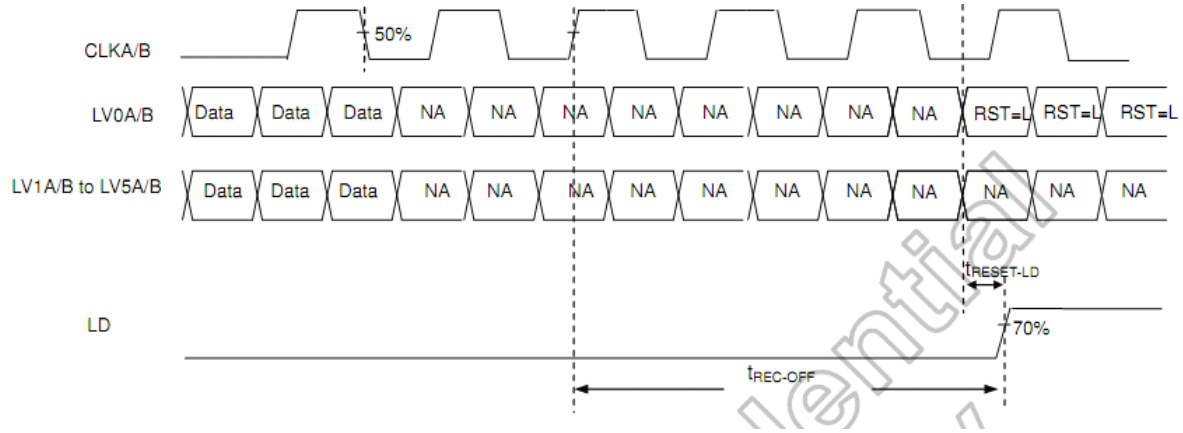


Timing for receiving data

Data input format (6-pair)



Last data sampling to LD timing



Mini-LVDS AC Characteristic

Parameter	Symbol	Spec Min.	Spec Typ.	Spec Max.	Unit	Condition
Clock period	t_{CLK}	4.8	-	-	ns	VCC=2.3V to 2.7V
		4(1)	-	-	ns	VCC=2.7V to 3.6V
Clock low pulse width	$t_{CLK(L)}$	1.9	-	-	ns	VCC=2.3V to 2.7V
		1.6	-	-	ns	VCC=2.7V to 3.6V
Clock high pulse width	$t_{CLK(H)}$	1.9	-	-	ns	VCC=2.3V to 2.7V
		1.6	-	-	ns	VCC=2.7V to 3.6V
Data setup time	t_{SETUP1}	1.1	-	-	ns	VCC=2.3V to 2.7V
		0.7	-	-	ns	VCC=2.7V to 3.6V
Data hold time	t_{HOLD1}	1.1	-	-	ns	VCC=2.3V to 2.7V
		0.7	-	-	ns	VCC=2.7V to 3.6V
CLK,LV[5:0] rising time	t_{RISE}	-	-	0.48	ns	VCC=2.3V to 2.7V
		-	-	0.4	ns	VCC=2.7V to 3.6V
CLK,LV[5:0] falling time	t_{FALL}	-	-	0.48	ns	VCC=2.3V to 2.7V
		-	-	0.4	ns	VCC=2.7V to 3.6V
Start pulse setup time	t_{SETUP2}	1	-	-	ns	VCC=2.3V to 2.7V
		1	-	-	ns	VCC=2.7V to 3.6V
Start pulse delay time	t_{PLH1}	-	-	13	ns	VCC=2.3V to 2.7V Loading=15pF
		-	-	11	ns	VCC=2.7V to 3.6V Loading=15pF
	t_{PHL1}	-	-	13	ns	VCC=2.3V to 2.7V Loading=15pF
		-	-	11		VCC=2.7V to 3.6V Loading=15pF
Reset(RST) high period	t_{RESETH}	50ns over 3 CLK	-	-		-
LD high period	$T_{LD(H)}$	200	-	-	ns	-
POL to LD setup time	t_{POL-LD}	5	-	-	ns	POL toggle to TP1 rising
LD to POL hold time	T_{LD-POL}	6	-	-	ns	TP1 falling to POL toggle
Receiver off to LD timing	$t_{REC-OFF}$	5	-	-	CLK	-
LD to reset input time	$T_{LD-RESET}$	200	-	-	ns	-
Reset low to LD rising time	$t_{RESET-LD}$	0	-	-	ns	-
Output stable time	T_{st}	-	-	6	µs	10% or 90% target voltage CL=60pF, R=2kΩ
Repair output delay time	T_{st1}	-	-	20	µs	10% or 90% target voltage CL=190pF, R=2kΩ

4.0 INTERFACE CONNECTION

Pin No.	Symbol	Remark	Pin No.	Symbol	Remark
1	VCOM	common voltage(Note 1)	31	V6	
2	GND	Ground	32	V3	
3	VCC	Voltage for digital circuit	33	V2	
4	GND	Ground	34	V1	
5	VEE	Gate off voltage(Note2)	35	GND	Ground
6	GND	Ground	36	MLV5N	Mini-LVDS data input
7	VGG	Gate on voltage(Note3)	37	MLV5N	Mini-LVDS data input
8	GND	Ground	38	GND	Ground
9	STVD	Vertical shift pulse signal input or output	39	MLV4N	Mini-LVDS data input
10	STVU	Vertical shift pulse signal input or output	40	MLV4P	Mini-LVDS data input
11	CKV	Vertical shift clock	41	GND	Ground
12	UD	Up/down selection	42	MLV3N	Mini-LVDS data input
13	OE	Output enable	43	MLV3P	Mini-LVDS data input
14	AVDD	Power supply	44	GND	Ground
15	GND	Ground	45	MLVCLKN	Mini-LVDS data input
16	VDD	Voltage for analog circuit	46	MLVCLKP	Mini-LVDS data input
17	POL	Polarity selection	47	GND	Ground
18	REV	Data invert control	48	MLV2N	Mini-LVDS data input
19	LD	Load output signal	49	MLV2P	Mini-LVDS data input
20	GND	Ground	50	GND	Ground
21	V14	Gamma voltage	51	MLV1N	Mini-LVDS data input
22	V13		52	MLV1P	Mini-LVDS data input
23	V12		53	GND	Ground
24	V11		54	MLV0N	Mini-LVDS data input
25	V10		55	MLV0P	Mini-LVDS data input
26	V9		56	GND	Ground
27	V8		57	SHL	Left/right selection
28	V7		58	TTLRSDS	Mini-LVDS 3/6 pair input mode
29	V6		59	DIO1	Horizontal start pulse signal input or output
30	V5		60	DIO2	Horizontal start pulse signal input or output

Note ：

1.VCOM=3.8V(typical) 可调

2.VGG：18~22V

3.VEE：-8~ -11V

4.The Pin Assignments is calculated by IC–driver(HX8286-A*3 HX8695-E*1), it maybe changed if customer use other IC.

5.0 OPTICAL SPECIFICATIONS

5.1 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.

5.2 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	40	45		°	Note 1
		Θ9		40	45		°	
	Vertical	Θ12		15	20		°	
		Θ6		45	50		°	
Contrast Ratio		CR	Θ= 0°	350	500			Note 2
Transmittance		T(%)	Θ= 0°	5.3	5.7			Note 3
NTSC		%	Θ= 0°	35	40			
ReproductionOf color	Red	Rx	Θ= 0°	0.579	0.594	0.609		Note 4 *Color filter Glass Without ITO
		Ry		0.286	0.301	0.316		
	Green	Gx		0.290	0.305	0.320		
		Gy		0.480	0.495	0.510		
	Blue	Bx		0.135	0.150	0.165		
		By		0.145	0.160	0.175		
White		Wx	Θ= 0°	0.282	0.297	0.312		
		Wy		0.309	0.324	0.339		
Response Time		Tr+Tf	Θ= 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.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 without APF Pol.

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

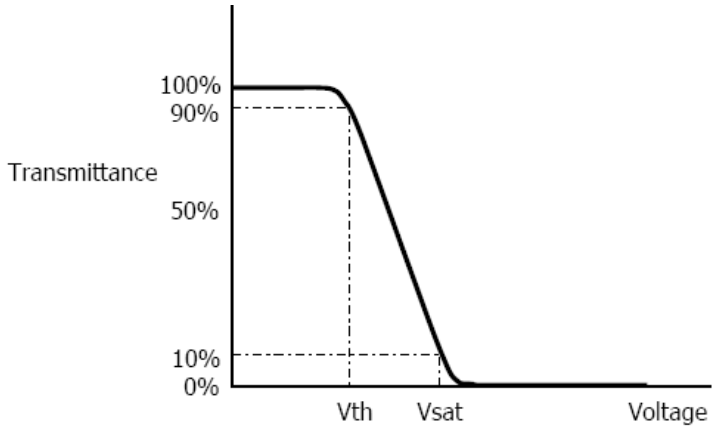


Figure 2. Measurement Set Up

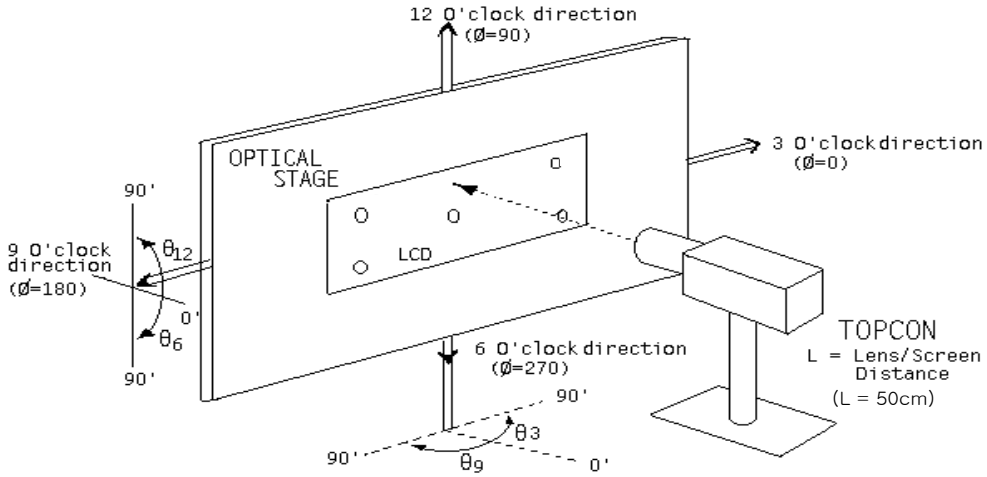
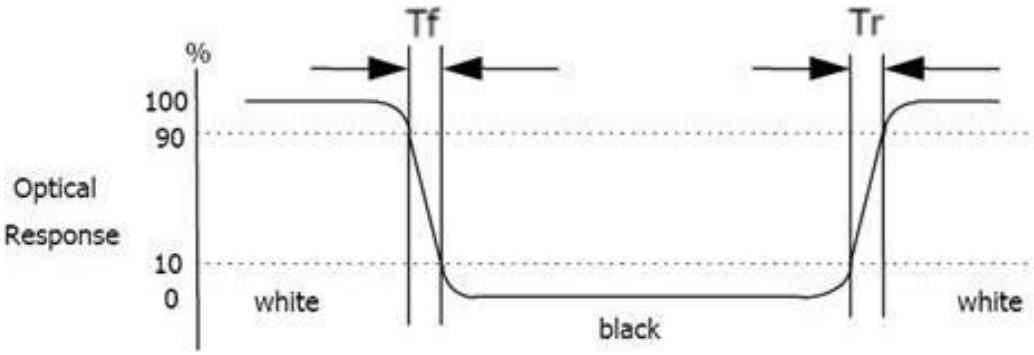


Figure 3. Response Time Testing

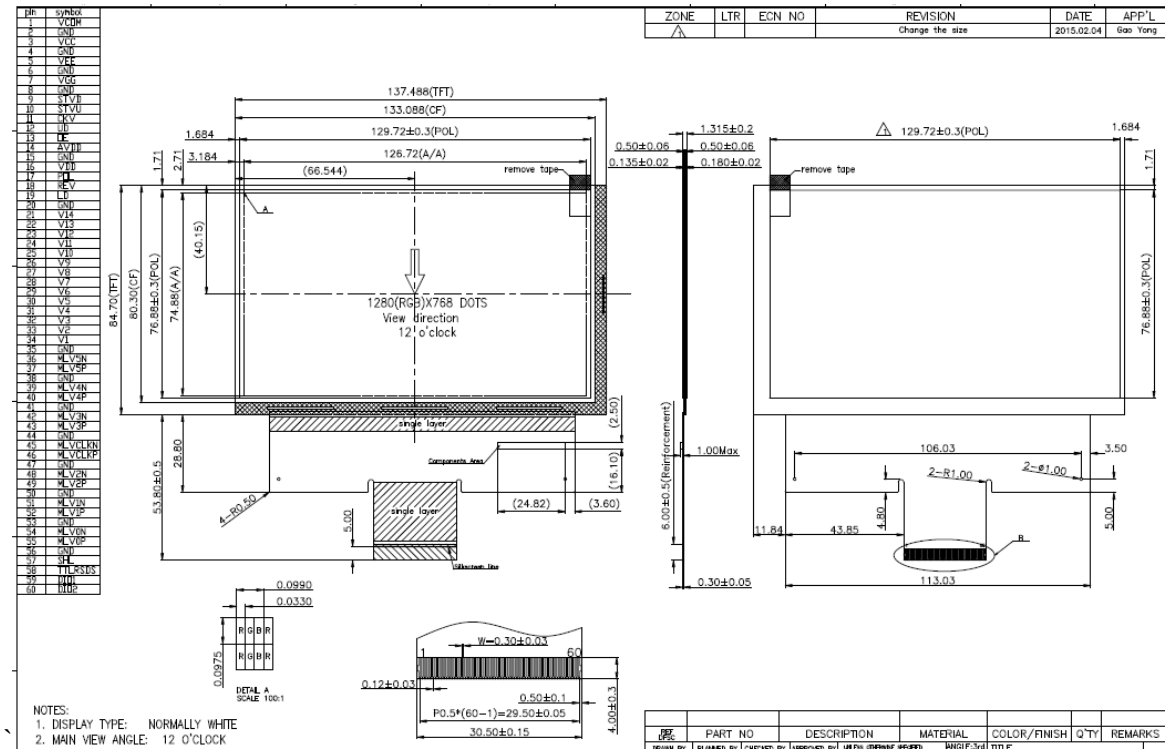


6.0 MECHANICAL CHARACTERISTICS

6.1 Dimension Requirements

Parameter	Specification	Unit	Remark
Panel size	137.488(H) × 84.70(V)	mm	
CF size	133.088(H) × 80.30(V)	mm	
Active area	126.72(H) × 74.88(V)	mm	
Dimensional outline	137.488±0.3(H)×84.70±0.30(V)×1.315±0.2(D)	mm	FOG

Figure 4. FOG Outline Dimension (unit:mm)



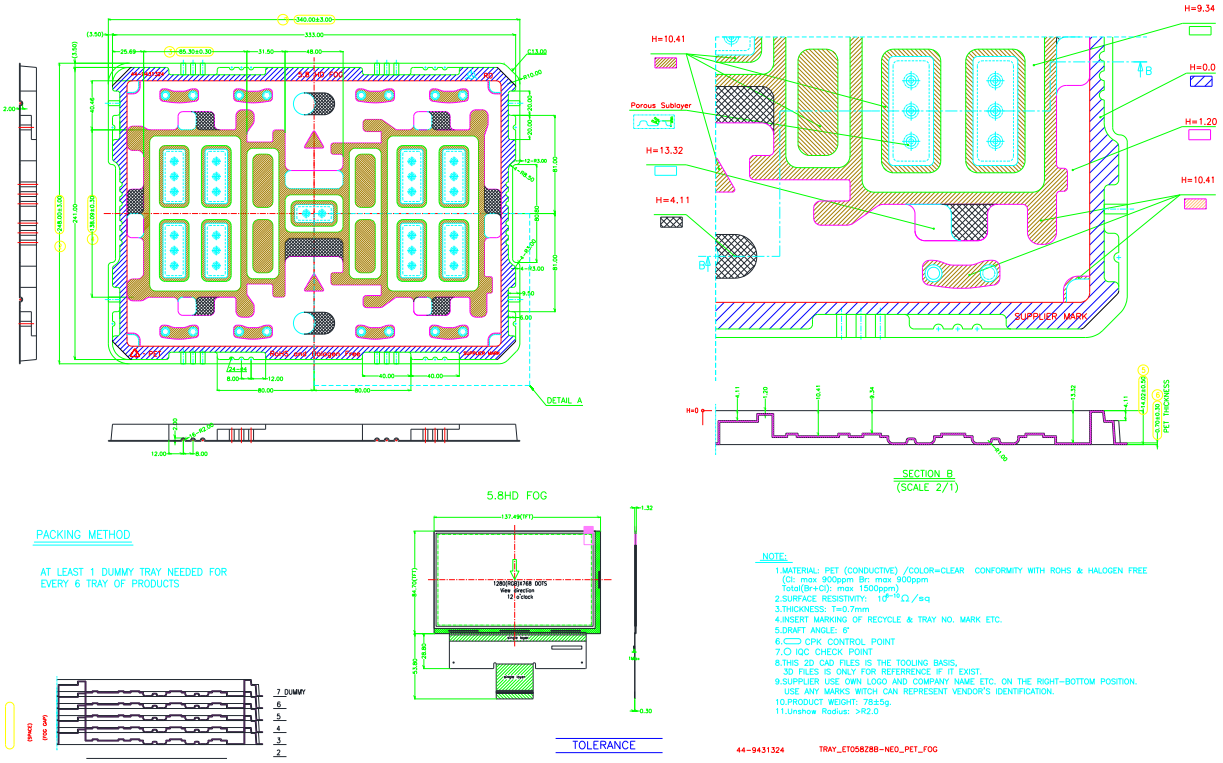
7.0 RELIABILITY TEST

NO.	Test Item	Test Condition	Duration
1	High temperature, high humidity operation test(THO)	60℃, 90%RH	24hrs
2	Low temperature operation test(LTO)	-20 ℃	240hrs
3	High temperature operation test(HTO)	70 ℃	120hrs
4	High temperature storage test(HTS)	80℃	240hrs
5	Low temperature storage test(LTS)	-30℃	240hrs
6	Thermal shock test (TST)	'-20℃ 30 min~+70℃, 30min,change time:5 Min,	200 Cycles
7	ESD	200pF, 0Ω, ±200V 1 time / each terminal	TBD (Module)

8.0 PACKING METHOD

8.1 Packing Tray

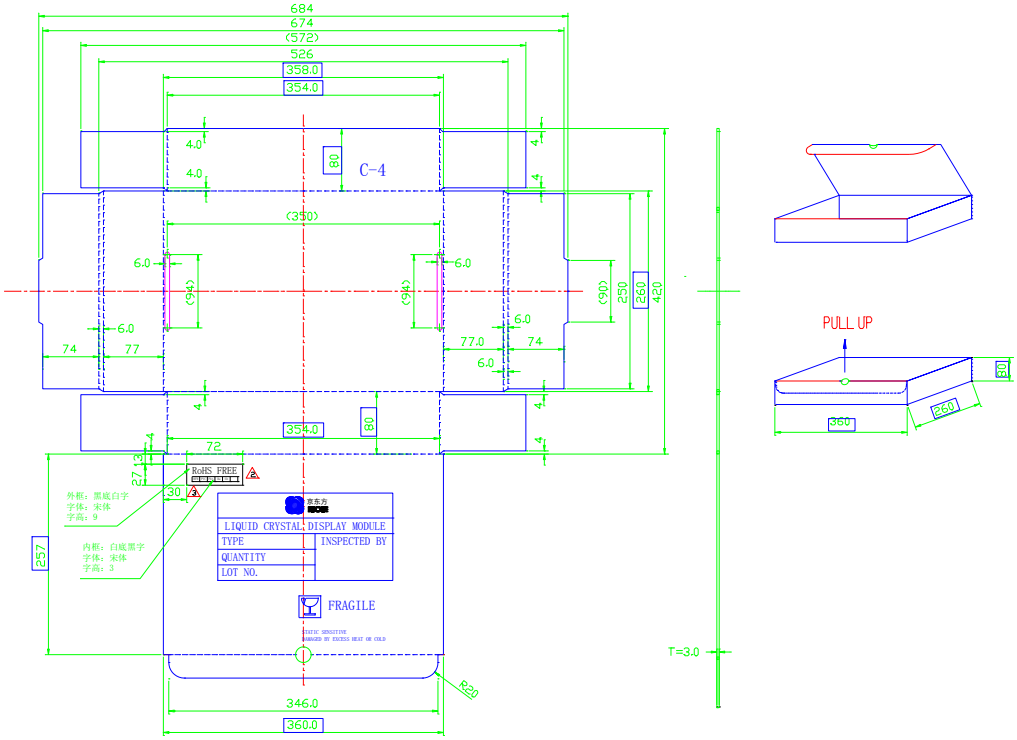
<Tray Size> L: 340 mm; W: 248 mm; 2 Pcs/tray



8.2 Inner Box

<Inner Box Size> L: 360mm; W: 260mm; H:80mm

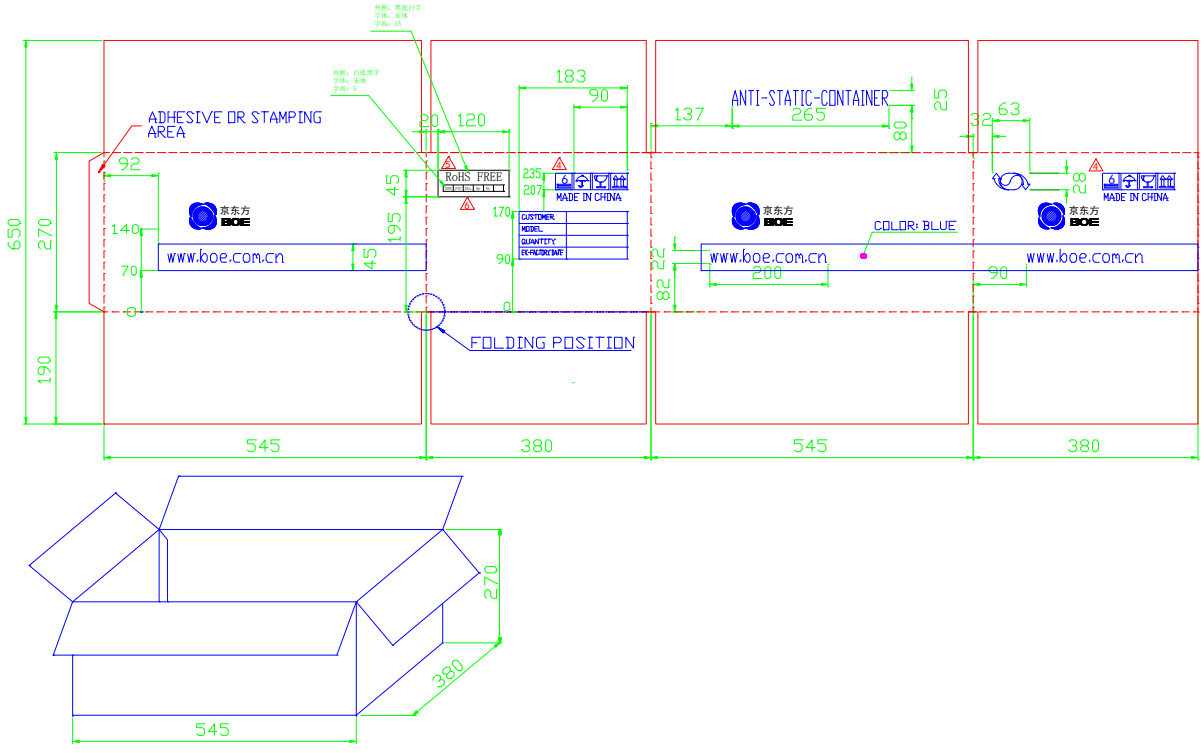
*** 6 tray (with cell) plus 1 Tray (without Cell) are packed in a vacuum with PE bag and put in every inner box**



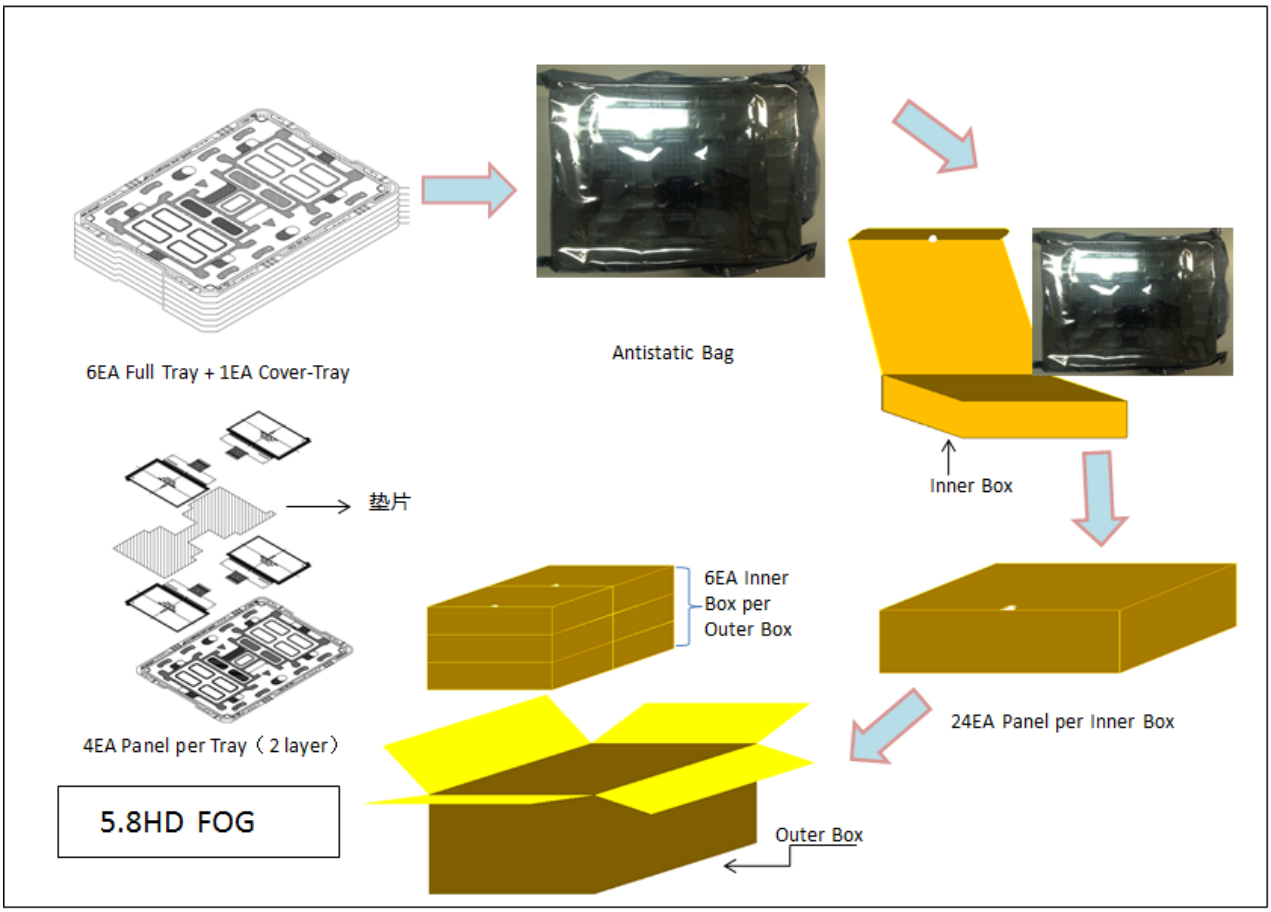
8.3 Outer Box

<Outer box size> L:545mm; W:380mm; H:270mm

6pcs inner box /Outer Box



8.4 Packing Process



8.5 Packing Notice

- Panel should be placed upwardly while in the tray.
- Every eight full trays with a blank one while twining twice on both sides by adhesive tape.
- Every tray should be put crossly.
- Panels should be packed in a vacuum with PE (anti-ESD) bag.

9.0 PRODUCT ID RULE

E T 058Z8B – N E0

1 2 3 4 5 6 7 8

1 <Application area>

Code	Description
E	Healthcare& industrial
S	Special display
A	Automotive

2 <Mode>

Code	Description
T	TN-a Si
S	ADS-LTPS
L	ESL/E-Paper

3 <Size>

Code	Description
058	5.8"
050	5.0"
060	6.0"

4 <Resolution>

Code	Description
Z8	Special resolution
WQ	WQVGA
LC	LQCIF

5 <Production type>

Code	Description
B	FOG
A	Array
S	Q-Panel SLM

6 <Product state>

Code	Description
N	Normal
E	In Cell Touch
A	Add On Touch

7 <Product THK>

Code	Description
E	工控医疗白牌

8 <Product Rev>

Code	Description
0	First Mode
1	Second Mode
2	Third Mode

10.0 HANDDLING & CAUTIONS

10.1 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.

10.2 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.

● Handle FPC with care.

10.3 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.

10.4 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

10.5 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.

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 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.

10.7 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.

11.0 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.