



2.27" TFT
MONO
REFLECTIVE
256*128
SPI





华田信科电子有限公司

HTdisplay ELECTRONICS CO.,LTD

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HTDISPLAY ELECTRONICS CO.,LTD.

The professional LCD manufacturer

www.htdisplay.com

SPECIFICATIONS

Product Name: LCM

Model PartNumber: HT023YFB

Revision: R00

Date: 2018-6-7

Prepared By:	Reviewed By:	Approved By:
HT		

Customer: _____

Customer Approved Result: OK NG

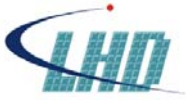
Customer Confirmed Message: _____

Approved By: _____ Date: _____



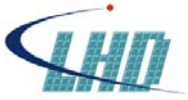
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1. Basic Features

ITEM	Mono	Unit
Technology	A-Si TFT LCD	
LCD Type	TFT, Positive, Reflective	
Structure	Bump reflector/TN liquid crystal	
Active area	25.408 (H)×51.712 (V)	mm
Dimensional Outline	28.4 (H)×68.7 (V)× 1.305(D)	mm
Border(L/R/U/D)	1.496/1.496/1.5/5.488	mm
Number of pixels	128(H)× 256(V)	pixels
Pixel pitch	198.5(H) x 202.0(V)	mm
Pixel arrangement	Vertical Stripe	
Polarizer	With HW & QW	
Driver IC	OTA5901	
Flex	1 layer FPC (TF31-36S-0.5SH)	



2. Electronic characteristics

2.1 Absolute maximum ratings

ITEM	Symbol	Rating			Unit
		Min	Typ	Max	
Operating temperature	TOP	-20	-	+50	°C
Storage temperature	TST	-30	-	+80	°C
Supply voltage for boost circuit	VBAT	-0.3	-	3.6	V
Supply voltage for I/O	VDDIO	-0.3	-	3.6	V
Static electricity	Be sure that you are grounded when handling LCM.				



2.2 Electrical characteristics (Ta = 25°C)

ITEM	Symbol	Condition	Rating			Unit
			Min	Typ	Max	
Supply voltage for Boost Circuit	VBAT	-	2.55	2.8	3.6	V
Supply voltage for I/O	VDDIO	-	1.65	2.8	3.6	V
Input signal low voltage	VIH	-	VSS	-	0.3*VDDIO	V
Input signal high voltage	VIL	-	0.7*VDDIO	-	VDDIO	V
Output signal low voltage	VOH	-	VSS	-	0.2*VDDIO	V
Output signal high voltage	VOL	-	0.8*VDDIO	-	VDDIO	V
Supply current for system	IBAT	VBAT=2.8V, SPI 0Hz LCD 1Hz refresh rate	-	7.5	TBD	uA
Supply current for digital	IDDIO	-	-	-	150	uA



2.3 Interface description

PIN	SYMBOL	I/O	Description	PIN	SYMBOL	I/O	Description
1	IM0	I	SPI mode select pins	19	VDH	O	Source data high voltage
2	IM1	I	SPI mode select pins	20	VDL	O	Source data low voltage
3	CLK	I	28k~200kHz Oscillator input	21	HVP	O	3xVDD5, most positive voltage
4	TE	O	Tearing effect output for M CU	22	VP2	I	Charge pump return pin
5	SD	I/O	SPI data input & output	23	VM2	I	Charge pump return pin
6	SCLK	I	SPI clock	24	CP0	O	Step-up cap
7	SCSX	I	SPI chip select, active low	25	CP1	O	Step-up cap
8	RESX	I	Reset pin, active low	26	VP3	I	Step-up cap
9	VDDIO	P	Voltage supply (2.8V typ.)	27	VM1	I	Step-up cap
10	VSSD	P	System ground	28	VM3	I	Step-up cap
11	VDD15	P	Low voltage analog supply, normally 1.5V	29	HVN	O	Step-up cap
12	VSR	O	Source recycling voltage	30	VGH	O	Stabilizing Cap
13	VBAT	P	Battery supply voltage(2.8V typ.)	31	VGM	O	Stabilizing Cap
14	VREF	O	1.2V output of integrated bandgap circuit	32	VGLL	O	Stabilizing Cap
15	VSSA	P	System ground for analog circuits	33	VGL	O	Stabilizing Cap
16	CFN	O	Low voltage boost capacitor	34	VCL	I	Stabilizing Cap
17	CFP	I	Low voltage boost capacitor	35	VOTP	I	Programming for OTP
18	VDD5	P	5V regulated output of boost regulator	36	VCOM	O	Connected to TVS



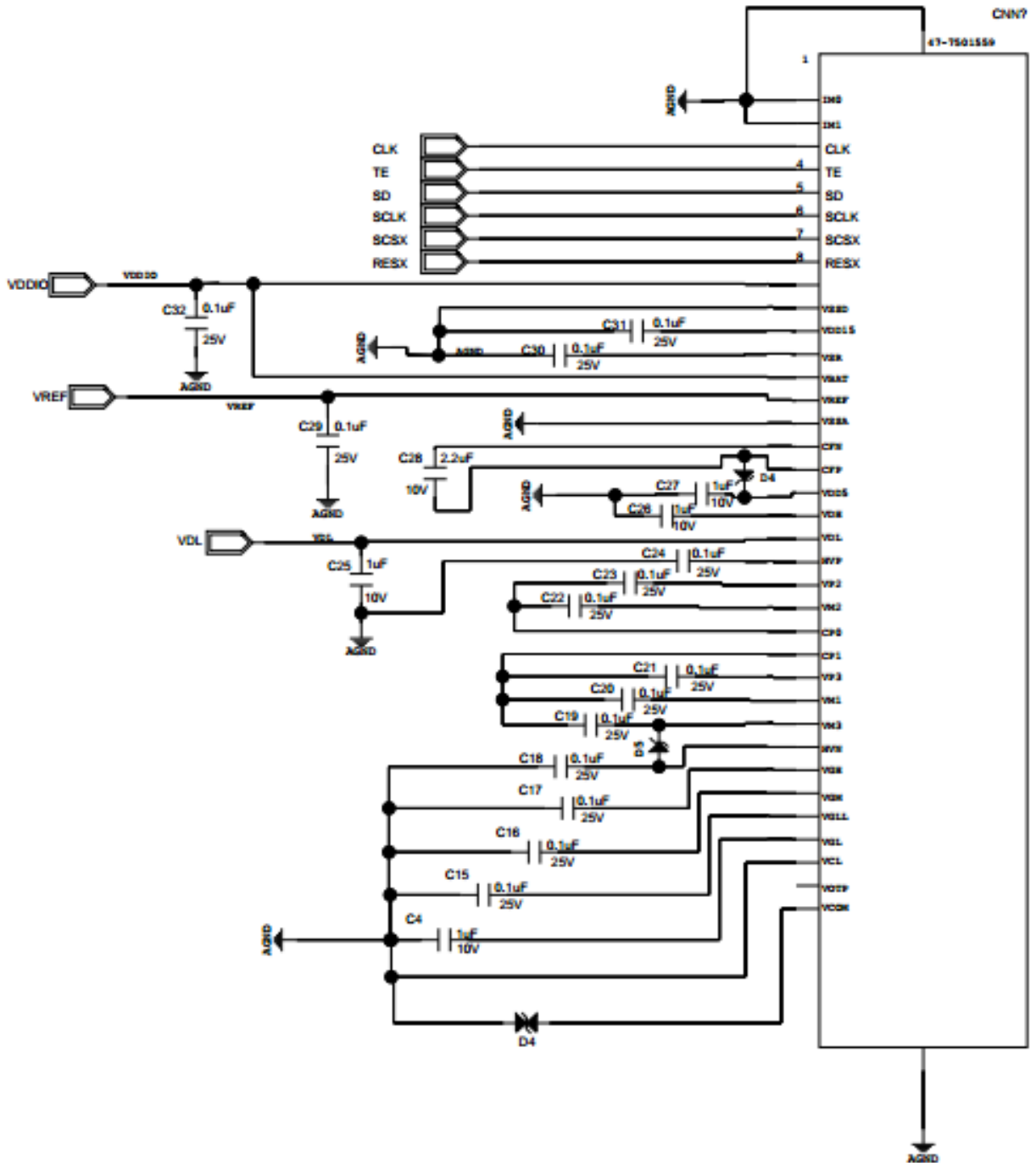
2.3 Interface description

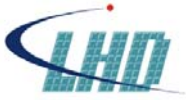
Note1.

IM[1:0]	SCLK idle state	SD in sample edge of SCLK	SD out transition edge of SCLK
00	Low	Rising	Falling
01	Low	Falling	Rising
10	High	Falling	Rising
11	High	Rising	Falling

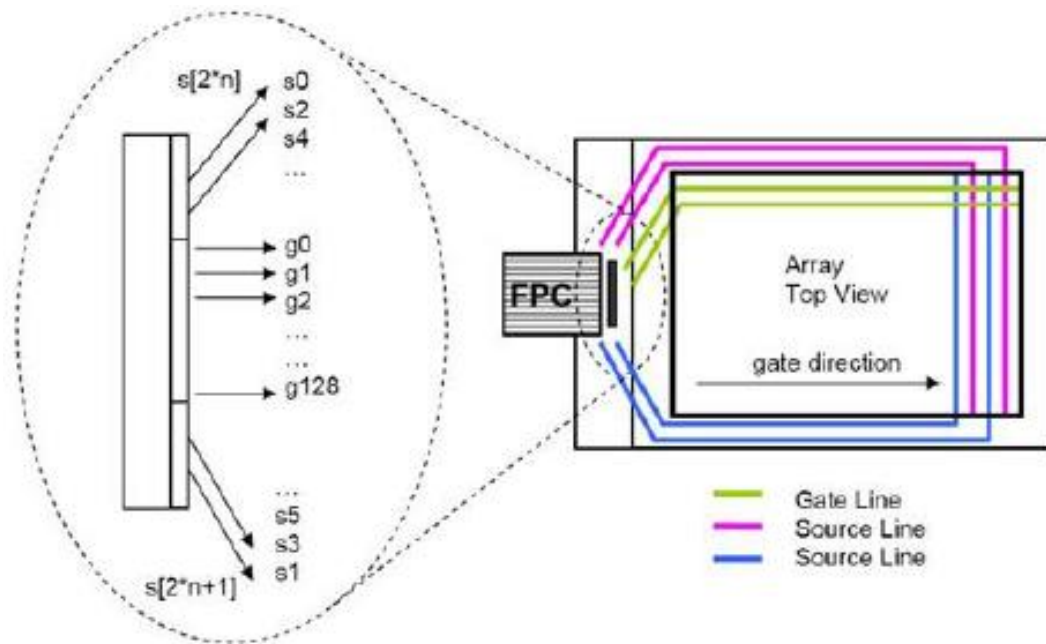


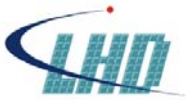
2.4 Power supply for LCD module



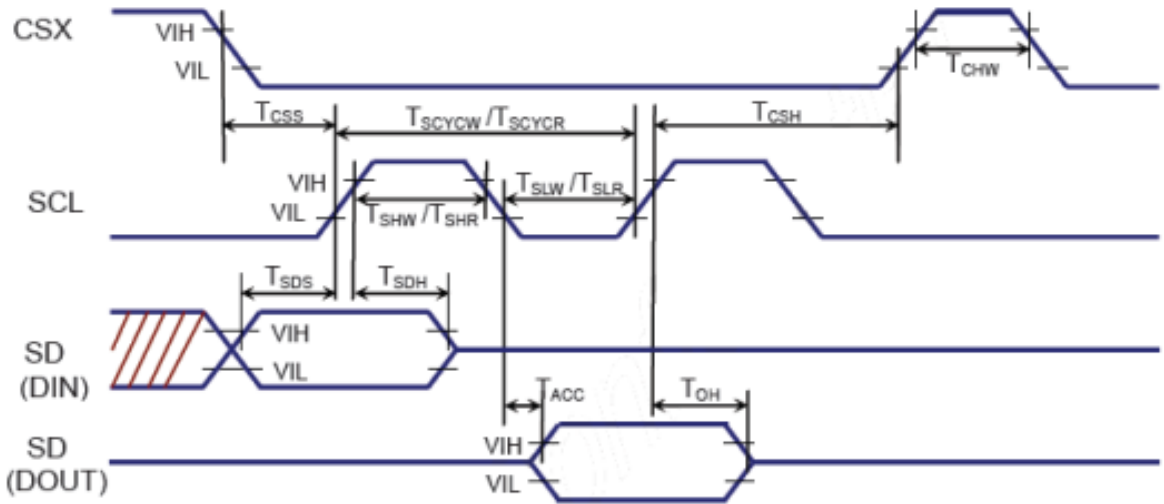


2.5 Block diagram





2.6 Timing characteristic



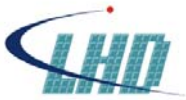
Signal	Symbol	Min	Max	Units	Notes
CSX	T_{CSS}	60		ns	
	T_{CSH}	200		ns	
	T_{CHW}	40		ns	
SCL	T_{SCYCW}	100		ns	
	T_{SHW}	40		ns	
	T_{SLW}	40		ns	
	T_{SCYCR}	400		ns	
	T_{SHR}	200		ns	
	T_{SLR}	200		ns	
SD	T_{SDS}	10		ns	
	T_{SDH}	10		ns	
	T_{ACC}	20		ns	
	T_{OH}	10	20	ns	



3. Electro-optical characteristics

3.1 Mono Product

ITEM	Symbol	Condition	Rating			Unit
			Min	Typ	Max	
View angle (θ)	$\psi=90^\circ$ (12H)	CR \geq 2	60	66	-	$^\circ$
	$\psi=270^\circ$ (6H)		60	66	-	$^\circ$
	$\psi=180^\circ$ (9H)		60	>70	-	$^\circ$
	$\psi=0^\circ$ (3H)		60	>70	-	$^\circ$
Point reflectance	R%	Ta=25 $^\circ$ C	22	27	-	%
Point contrast ratio	CR	Ta=25 $^\circ$ C	15	20.8	-	-
Response time	Tr	Ta=25 $^\circ$ C	-	-	40	ms
	Tf		-	-	40	ms
Color coordinate	Wx	Ta=25 $^\circ$ C	0.275	0.305	0.340	@ D65 Light
	Wy		0.300	0.340	0.370	
LCD Type	-	TFT, Positive, reflective				



Note :

1. All the optical data should be measured when the display is driven under the TYP condition.
2. Reflectance and CR is measured by DMS 900 when light source is input from four direction, respectively.
3. Color are all measured by DMS 900 when light source is input from FPC side as shown in figure 2.
4. Viewing Angle is measured by DMS 900 from Relative direction as shown in figure 3 when light source is input from four direction, respectively.
5. RT is measured by Optiscope as shown in figure 4

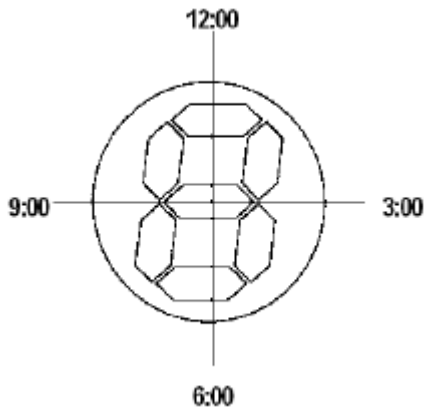


Figure 1

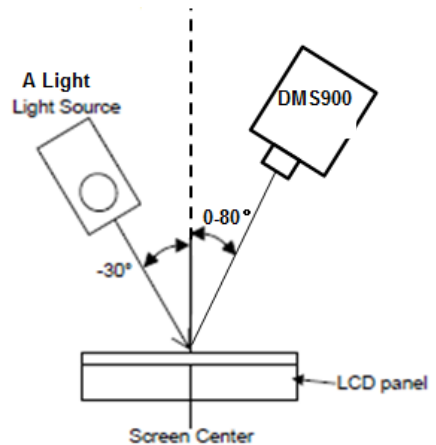


Figure 3

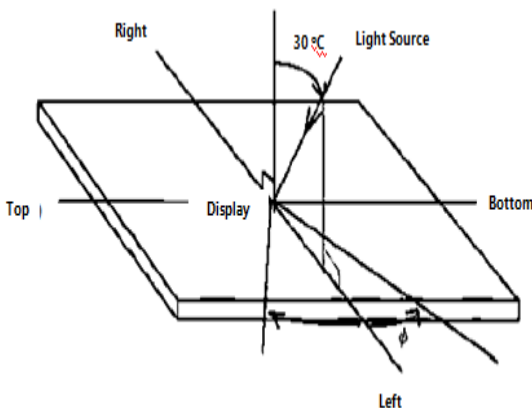


Figure 2

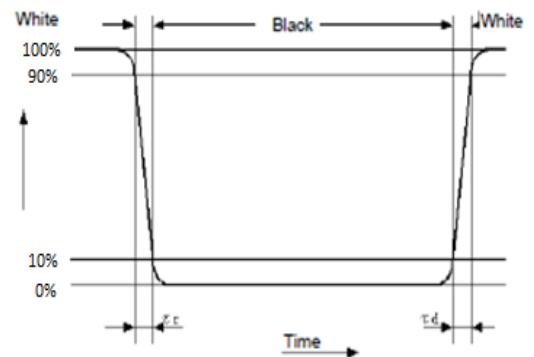
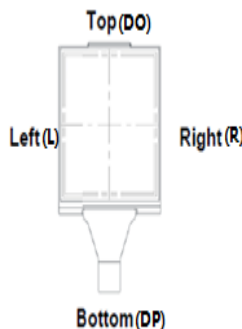


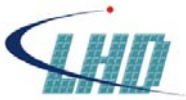
Figure 4



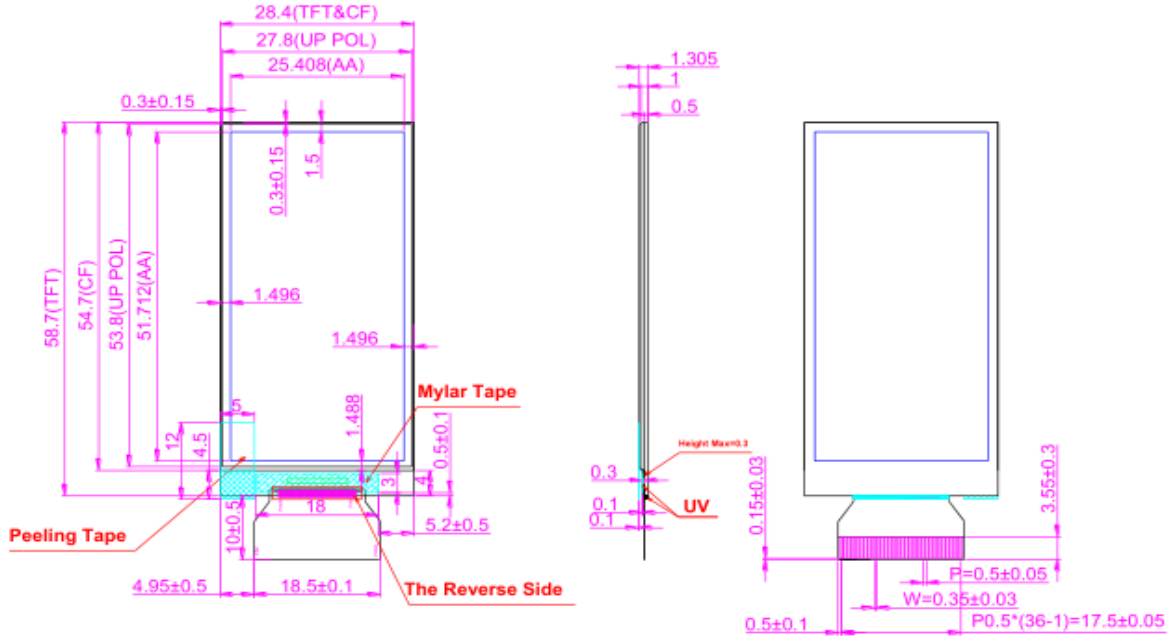
4. Mechanical Characteristics

<Table Dimensional Parameters>

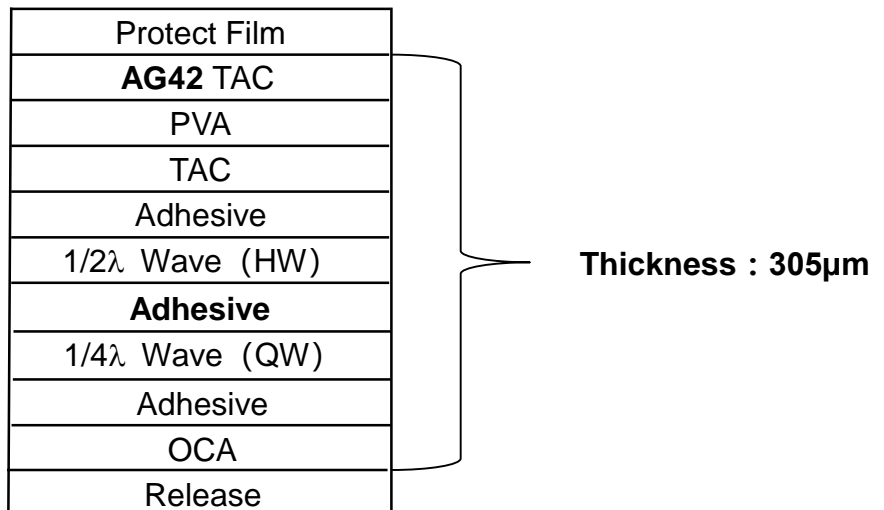
Parameter	ITEMS	Unit	Remark
Dimensional Outline	28.4 (H)×68.7 (V)× 1.305(D)	mm	
Active area	25.408 (H)×51.712 (V)	mm	
Border(L/R/U/D)	1.496/1.496/1.5/5.488	mm	
Number of pixels	128(H)× 256(V)	pixels	
Pixel pitch	0.219 (H) ×0.219 (V)	mm	
Weight	TBD	gram	



4.1 Mechanical drawings



4.2 Polarizer Structure





5. Reliability Test

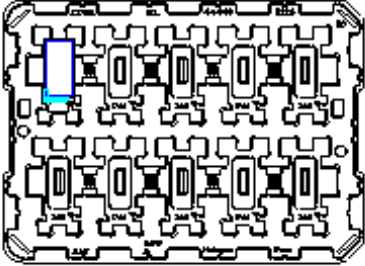
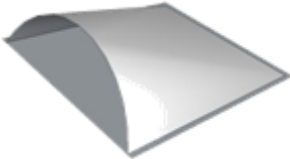


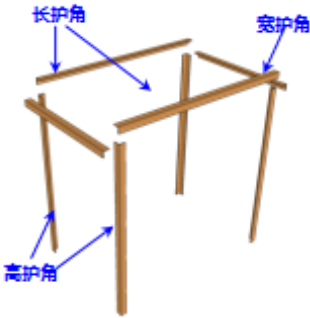

The Reliability test items and its conditions are shown in below.

No	Test Items	Conditions
1	High temperature storage test	Ta = 80 °C, 240 hrs
2	Low temperature storage test	Ta = -20 °C, 240 hrs
3	High temperature & high humidity operation test	Ta = 40 °C, 90%RH, 240hrs
4	High temperature operation test	Ta = 70 °C, 240hrs
5	Low temperature operation test	Ta = 0 °C, 240hrs
6	Thermal shock(non-operating)	Ta = -20 °C ↔ 80 °C (0.5 hr), 100 cycle
7	Electrostatic Discharge Test Operating	C=150pF, R=330Ω, 5 points/panel, Air : ±2KV Contact : ±4KV
8	Shock test	50G, 11ms, half-sine wave(+/-X, +/-Y, +/-Z). Test time : 1 time for every direction
9	Vibration Test	1.5G, 50~500~50Hz, sine wave, 30mins/axis, 3 direction, amplitude 1mm
10	Drop Test	Height : 60cm. 1 corner, 3 edges, 6 surfaces

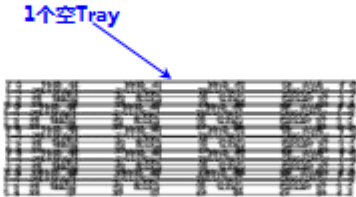
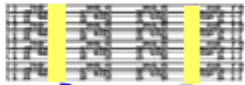


6. Packing Information

6.1 Packing List

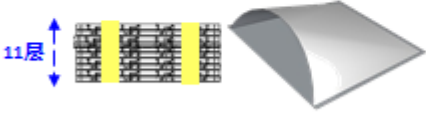
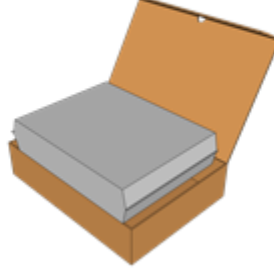
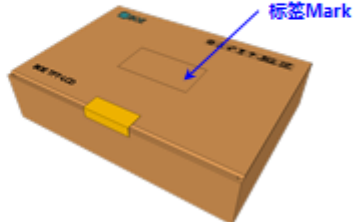



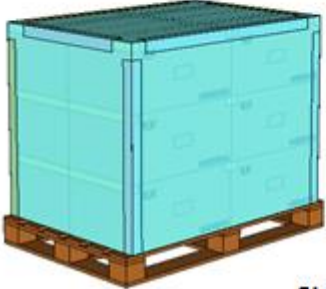
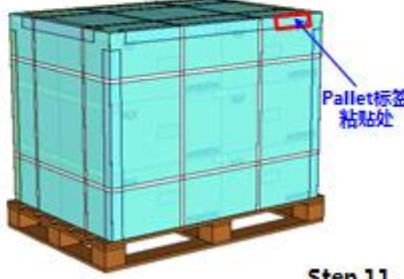
Tray	Shielding Bag	Inner Box
		
Outer Box	Paper Corner	Pallet
		

6.2 Packing Process

将10pcs FOG 产品平放入Tray中。	将盛装FOG的Tray直叠码放10层，然后整理上面加放1个空Tray作盖。	用美纹胶带平行于Tray的宽边方向捆绑两道，每道至少缠绕3圈美纹胶带。
10 FOG/ Tray	100 FOG/11 Tray	
 Step 1	 Step 2	 Step 3



6.2 Packing Process

<p>将11层 Tray放入一个Shielding Bag中，并抽真空。（真空标准详见Appendix）</p> <p>100 FOG/Shielding Bag</p>	<p>将封好口的一包产品放入一个Inner Box。</p> <p>100 FOG/Inner Box</p>	<p>用封箱胶带对Inner Box进行封箱，并在Box的Mark框处粘贴Box标签。</p> <p>100 FOG/Inner Box</p>
 <p>11层</p> <p>Step 4</p>	 <p>Step 5</p>	 <p>标签Mark</p> <p>Step 6</p>
<p>将封好的Inner Box装入Outer Box。</p> <p>6 Inner Box/Outer Box</p>	<p>采用“H”形封箱方式，对Box进行封箱，并在Box的Mark处粘贴相应Box标签。</p> <p>600 FOG/Outer Box</p>	<p>按“田”字型对Outer Box进行码拍，粘贴对应标签，粘贴方案见Label and Position. 12 Outer Box/Pallet</p>
 <p>Step 7</p>	 <p>标签Mark</p> <p>Step 8</p>	 <p>Step 9</p>
<p>放置护角、缠绕拉伸膜，缠绕层数不少于5层，除底面外的5个面需要全部覆盖。</p> <p>7200 FOG/Pallet</p>	<p>用打包带打包，横向、纵向每侧各打2道打包带，并粘贴Pallet标签。</p> <p>7200 FOG/Pallet</p>	
 <p>Step 10</p>	 <p>Pallet标签 粘贴处</p> <p>Step 11</p>	



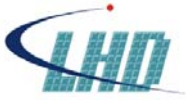
7.0 Handling & Cautions

7.1 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.

7.2 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, Trichlorotrifluoroethane
- 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.



7.3 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.

7.4 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.



7.5 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.

7.6 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.

7.7 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 and 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 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 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.