

# PRODUCT SPECIFICATION

## TFT-LCD MODULE

**Model No: AML116FDDI3001**

<b>For Customer's Acceptance</b>	
<b>Approved by</b>	<b>Comment</b>

	<b>Signature</b>	<b>Date</b>
<b>Prepared by</b>		
<b>Checked by</b>		
<b>Approved by</b>		

### REVISION STATUS

Version	Revise Date	Page	Content	Modified by
V1.0	2016.09.25	-	First Issued.	CJP
V1.1	2016.12.09	-	Update the item 2.0 LCM module chart	CJP
V1.2	2017.01.19	-	Update Storage Temperature	CJP

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## 1. GENERAL DESCRIPTION

### 1.1 DESCRIPTION

AML116FDDI30-01A is a color active matrix thin film transistor (TFT) IPS liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, Driver IC ,FPC,PCBA and Backlight.

### 1.2 FEATURES:

No.	Item	Specification	Unit
1	Panel Size	11.6"	inch
2	Number of Pixels	1920×RGB (3) ×1080	pixels
3	Active Area	256.32(H)x 144.18(V)	mm
4	Pixel Pitch	0.1335 (H)×0.1335(V)	mm
5	Outline Dimension	263.5(W)×157.32(H)×2.5(D)	mm
6	Number of Colors	16.7M	-
7	Display Mode	Normally Black	-
8	Viewing Direction	ALL	-
9	Display Format	RGB vertical stripe	-
10	Luminance (cd/m <sup>2</sup> )	250 (TYP.)	nit
11	Contrast Ratio	700(min.)	
12	Surface Treatment	Anti Glare	-
13	Interface	eDP	-
14	Backlight	White LED	-
15	Operation Temperature	0-50	°C
16	Storage Temperature	-20-55	°C
17	Polarizer Type	AG:Anti Glare(2H,3H)	-
		HC:Hard Coating	-



### 3. PIN DESCRIPTION

No.	Symbol	I/O	Function	Remark
1	NC	-	Non connection	
2	H_GND	P	High Speed Ground	
3	Lane1_N	-	Complement Signal Link Lane 1	
4	Lane1_P	-	True Signal Link Lane 1	
5	H_GND	P	High Speed Ground	
6	Lane0_N	I	Complement Signal Link Lane 0	
7	Lane0_P	I	True Signal Link Lane 0	
8	H_GND	P	High Speed Ground	
9	AUX_CH_P	I	True Signal Auxiliary Channel	
10	AUX_CH_N	I	Complement Signal Auxiliary Channel	
11	H_GND	P	High Speed Ground	
12	LCD_VCC	P	Logic power 3.3V	
13	LCD_VCC	P	Logic power 3.3V	
14	NC	-	NC	
15	LCD_GND	P	Ground	
16	LCD_GND	P	Ground	
17	HPD	O	Hot plug detection	
18	BL_GND	P	LED Cathode	
19	BL_GND	P	LED Cathode	
20	BL_GND	P	LED Cathode	
21	BL_GND	P	LED Cathode	
22	BL_ENABLE	I	Backlight ON/OFF	
23	BL_PWM_DIM	I	System PWM	
24	NC	-	Non connection	
25	NC	-	Non connection	
26	BL_PWR	P	LED Anode	12V/280 mA (typ)
27	BL_PWR	P	LED Anode	
28	BL_PWR	P	LED Anode	
29	BL_PWR	P	LED Anode	
30	NC	-	Non connection	

## 4. ELECTRICAL CHARACTERISTICS

### 4.1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Logic power Supply	VCC	-0.3	3.3	4.2	V	

### 4.2 OPERATING CONDITIONS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Logic power Supply	VCC	3.0	3.3	3.6	V	
BL_POWER Supply	BL_PWR	7	12	21	V	B/L Power

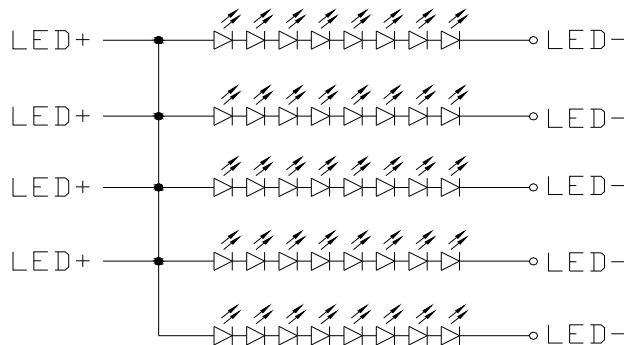
### 4.3 CURRENT CONSUMPTION

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Logic power Current	IVCC	VCC=3.3V	-	220	-	mA	
BL_PWR Current	I B/L	BL_PWR=12V	-	280	-	mA	B/L Current

### 4.4 BACK LIGHT UNIT

Ta=25°C

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I <sub>LED</sub>	-	100	-	mA	40LEDS
Forward voltage	V <sub>F</sub>	-	24	-	V	I <sub>F</sub> =100mA 40LEDS
Reverse current	I <sub>R</sub>	-	-	50	μA	V <sub>R</sub> =10V,1LED
Luminous tolerance	I <sub>V-M</sub>	70	75	-	%	(Min/Max)×100
Power dissipation	P <sub>d</sub>	2450			mW	40LEDS
Peak forward current	I <sub>FP</sub>	100			mA	1LED
Reverse Voltage	V <sub>R</sub>	10			V	1LED

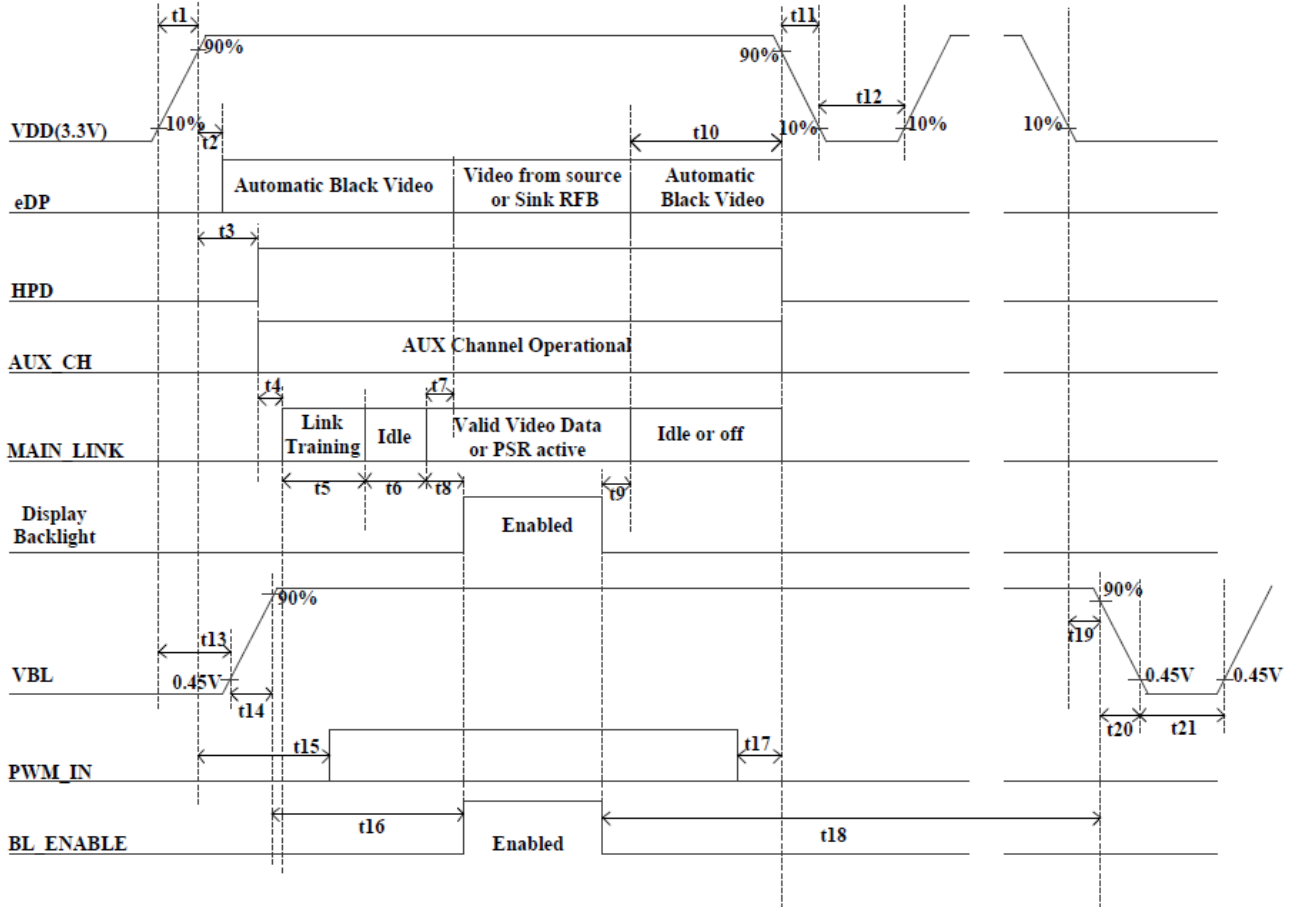


$$5 \times 8 = 40 \text{EA} \quad V_f = 24 \text{V}$$

$$(I_f = 20 \text{mA} \times 5 = 100 \text{mA})$$

## 5. INPUT SIGNAL TIMING

### 5.1 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNA





[Note] Do not keep the interface signal high-impedance or unusual signal when power is on.

Symbol	Min	Max	Unit	Note
t1	0.5	10	ms	
t2	0	100	ms	
t3	0	100	ms	
(t4)	-	-	ms	
(t5)	-	-	ms	
(t6)	-	-	ms	
(t7)	0	50	ms	
(t8)			ms	
(t9)			ms	
(t10)	0	500	ms	
t11	1	50	ms	[Note1]
t12	500	-	ms	
(t13)	-	-	ms	
t14	0.5	10	ms	
t15	100		ms	
(t16)	-	-	ms	
t17	0	-	ms	
(t18)	-	-	ms	
t19	-	-	ms	
t20	0.1	-	ms	
t21	100		ms	

## 5.2 DC CHARACTERISTICS

DC Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
+3.3V supply voltage	VDD	+3.0	+3.3	+3.6	V	[Note 6-1-1]
Current dissipation	IDD	-	212	364	mA	[Note 6-1-2]
Inrush Current	Irush	-	-	1.0	A	[Note 6-1-3]
Permissible input ripple voltage	V <sub>RP</sub>	-	-	100	mVp-p	VDD=+3.3V
eDP HPD Signal Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
HPD High level output voltage	VOH <sub>HPD</sub>		VDD-0.1	-		
HPD Low level output voltage	VOL <sub>HPD</sub>	-	0			
eDP AUX Channel Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Unit Interval for AUX channel	UI <sub>AUX</sub>	0.4	0.5	0.6	μS	
Peak-to-peak voltage at TP1	V <sub>AUX-DIFF-pp</sub>	0.32	-	1.36	V	
AUX DC Common mode Voltage	V <sub>AUX-DC-CM</sub>	0	-	2.0	V	
AUX Short current limit	I <sub>AUX_SHORT</sub>	-	-	90	mA	
AUX CH termination Resistor	R <sub>AUX_TERM</sub>	-	100	-	Ω	Differential input
AUX AC coupling capacitor	C <sub>AUX</sub>	75	-	200	nF	
Number of pre-charge pulses	Pre-charge pulses	10	-	16	-	
eDP Main Link Receiver Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Link clock down spreading	Down_Spread_Amplitude	0		0.5	%	
Differential Peak-to-peak Input Voltage at Rx package pins	V <sub>RX-DIFFp-p</sub>	120	-	1200	mV	
Differential Return Loss at 1.35GHz at Rx package pins	RL <sub>RX-DIFF</sub>	9	-	-	dB	
Differential termination resistance	R <sub>RX-TERM</sub>	-	100	-	Ω	
RX short circuit Current Limit	I <sub>RX-SHORT</sub>	-	-	50	mA	
Lane Intra-pair Skew at RX package pins	T <sub>RX-SKEW-INTRA-PAIR-High-Bit-Rate</sub>	-	-	TBD	ps	

### 5.3 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

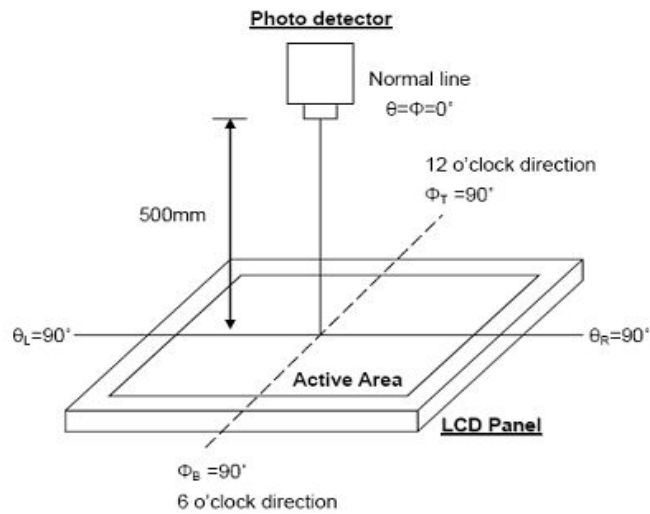
Color & Gray Scale		Input Data Signal																							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of White	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	▽	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

## 6.OPTICAL CHARACTERISTICS

Ta=25°C±2

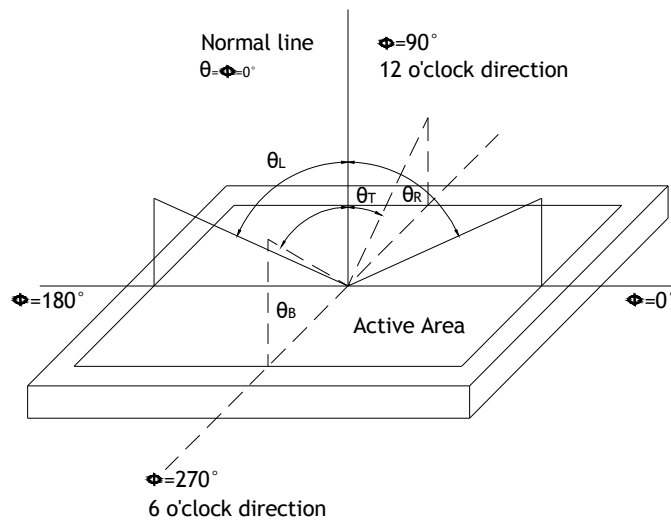
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta = 0^\circ$	700	1000	-		Note1 Note4
Luminance		YL		220	250	-	cd/m2	Note1 Note6 Note7
Luminance Uniformity		IV-M		70	75		%	
Response Time (Rising + Falling)		T <sub>RT</sub>	Ta= 25°C $\theta = 0^\circ$	3.85	4.2	-	ms	Note1 Note3
Viewing Angle range	Horizontal	θ <sub>L</sub>	CR > 10	-	89	-		Note2
		θ <sub>R</sub>		-	89	-		
	Vertical	θ <sub>U</sub>		-	89	-		
		θ <sub>D</sub>		-	89	-		
Color Chromaticity	White	x	θ = 0°	-0.03	0.277	+0.03		Note1 Note5 Note7
		y			0.318			
	Red	x			0.570			
		y			0.320			
	Green	x			0.313			
		y			0.571			
	Blue	x			0.137			
		y			0.117			
NTSC				-	72	-	%	

Note1: Definition of optical measurement system.



Note2: Definition of viewing angle range and measurement system

Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).



Note3: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.

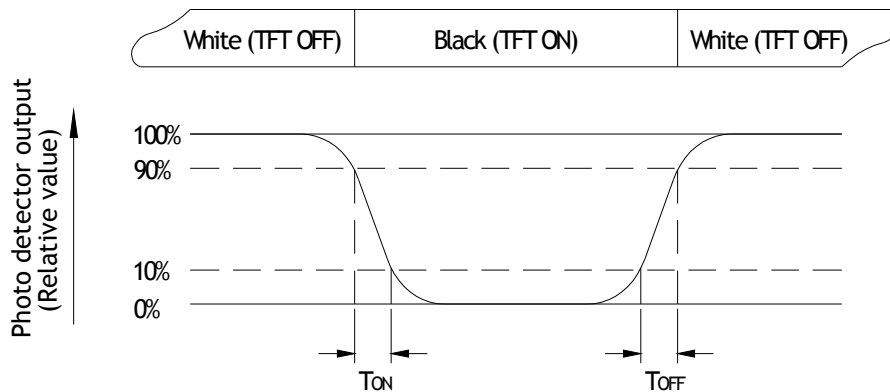


Fig. 6-3 Definition of response time

Note4: Definition of contrast ratio

**Luminance measured when LCD on the Whitestate**

Contrast ratio(CR)=**Luminance measured when LCD on the Blackstate**

“White state “: The state is that the LCD should drive by  $V_{white}$ .

“Black state”: The state is that the LCD should drive by  $V_{black}$ .

$V_{white}$ : To be determined  $V_{black}$ : To be determined.

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

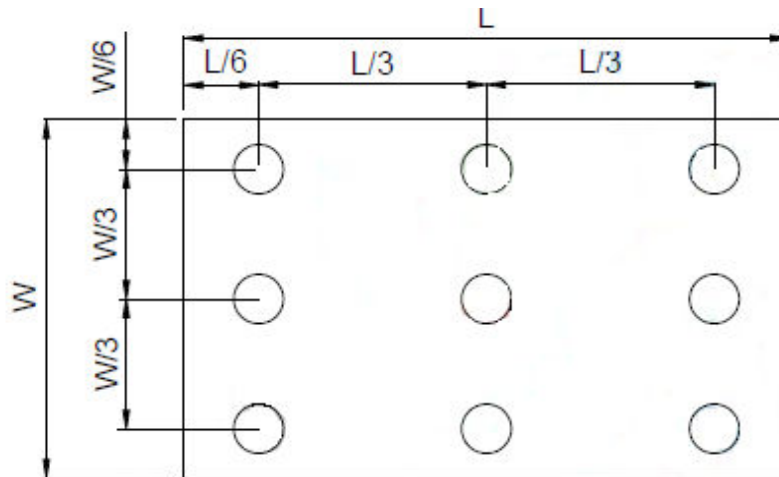
Note6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is  $I_L=100mA$ .

Note7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas. Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) =  $L_{min} / L_{max}$

L----Active area length, W---- Active area width



$B_{max}$ : The measured maximum luminance of all measurement position.

$B_{min}$ : The measured minimum luminance of all measurement position.

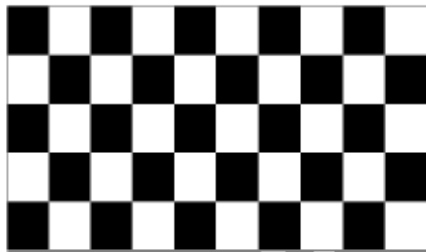
## 7. RELIABILITY TEST ITEMS

### 7.1 TEMPERATURE AND HUMIDITY

Test Item	Test Condition	Remark
High Temperature Storage	Ta=55°C; 72hrs	IEC60068-2-1 : 2007 GB2423.2-2008
Low Temperature Storage	Ta=-20°C; 72hrs	IEC60068-2-1 : 2007 GB2423.1-2008
High Temperature Operation	Ta=50°C , 72Hrs	IEC60068-2-1 : 2007 GB2423.2-2008
Low Temperature Operation	Ta=0°C; 72hrs	IEC60068-2-1 : 2007 GB2423.1-2008
High Temperature High Humidity Operation	Ta=50°C , 90%RH , 72Hrs(no condensation)	IEC60068-2-78 : 2001 GB/T2423.3-2006
Thermal Shock	-20°C (0.5h) ~55°C (0.5h) / 10cycles	Start with cold temperature , End with high temperature , IEC60068-2-14:1984,GB2423.22-2002
Image Sticking	25°C ; 4hrs	Note1

Note1:Condition of image sticking test :25°C±2°C

Operation with test pattern sustained for 4hrs,then change to gray pattern immediately.after5 mins,themura must be disappeared completely



(a) Test Pattern (chess board Pattern )



(b) Gray Pattern

### 7.2 VIBRATION & SHOCK

Test item	Conditions	Remark
Packing Shock (non-operation)	980m/s <sup>2</sup> ,6ms, ±x,y,z 3times for direction	IEC60068-2-27 : 1987 GB/T2423.5-1995
Packing Vibration (non-operation)	Frequency range:10 HZ~50HZ Stroke:1.0mm,sweep:10 HZ ~50HZ x,y,z 2 hours for each direction	IEC60068-2-32 : 1990 GB/T2423.8-1995

### 7.3 ESD

Test item	Conditions	Remark	
Electro Static Discharge Test (non-operation)	150pF , 330Ω , Contact:±4KV,Air:±8KV	1	IEC61000-4-2 : 2001 GB/T17626.2-2006
	200pF , 0Ω , ±200V contact test	2	

Note: Measure point :

1. LCD glass and metal bezel
2. IF connector pins

## 8. GENERAL PRECAUTION

### 8.1 SAFETY

1. Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
2. If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
3. If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

### 8.2 STORAGE CONDITIONS

1. Store the panel or module in a dark place where the temperature is  $23\pm 5^{\circ}\text{C}$  and The humidity is below  $50\pm 20\%\text{RH}$ .
2. Store in anti-static electricity container.
3. Store in clean environment, free from dust, active gas, and solvent.
4. Do not place the module near organics solvents or corrosive gases.
5. Do not crush, shake, or jolt the module.

### 8.3 HANDLING PRECAUTIONS

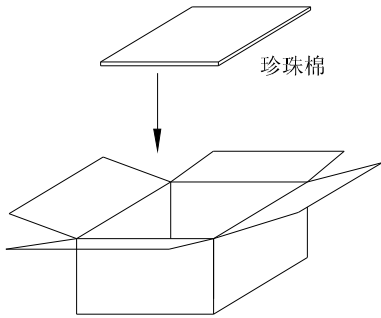
- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
- (6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.
- (9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
- (10) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.
- (11) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

### 8.4 WARRANTY

- (1) The period is within twelve months since the date of shipping out under normal using and storage conditions.
- (2) Do not repaired or modified the LCM. It may cause function to lose efficacy, Xian Chuang does not warrant the LCM.
- (3) All process and material comply ROHS.

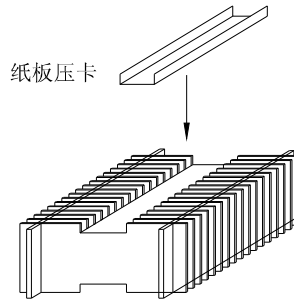


## 9. PACKAGE DRAWING

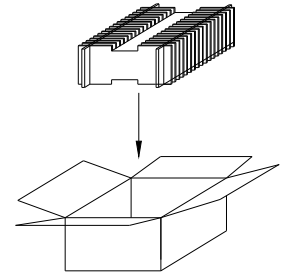


包装箱（外纸箱）

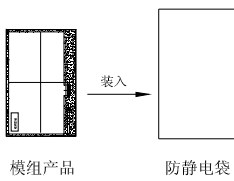
第一步：  
1、将珍珠棉垫于空纸箱下面



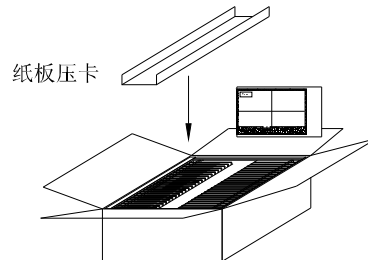
第二步：  
1、将纸板压卡垫于纸板卡条的下卡槽



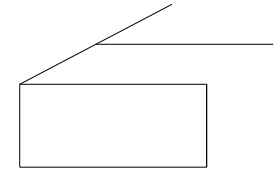
第三步：  
1、将纸板卡条放入纸箱中



第四步：  
1、将模组产品装入防静电袋中



第五步：  
1、将2pcs模组产品玻璃面紧靠放入纸板卡槽中，  
2、将纸板压卡装入纸板卡条的上卡槽



第六步：  
1、用透明胶封箱