

深圳市阿美林电子科技有限公司  
Shenzhen Amelin Electronic Technology Co., Ltd.

APPROVAL SHEET  
承 认 书

Customer 客户名称	
Part NO. 产品型号	AML101830B-A12
Product type 产品内容	Mode: Transmissive type .Normally white. TFT LCD Module LCD Module: Graphic 1024RGB*600Dot-matrix
Remarks 备注栏	<input type="checkbox"/> APPROVAL FOR SEPCIFICATIONS ONLY <input checked="" type="checkbox"/> APPROVAL FOR SEPCIFICATIONS AND SAMPLE
Signature by Customer: 客户确认签章	

Issued by	Checked by	Approved by

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**1. PHYSICAL DATA**

<b>Item</b>	<b>Contents</b>	<b>Unit</b>
LCD type	TFT TRANSMISSIVE	---
Viewing direction	6	o'clock
Module size (W×H×T)	235× 143 × 2.8	mm <sup>3</sup>
Active area(W×H)	222.72 ×125.28	mm <sup>2</sup>
Number of dots(W×H)	1024*RGB* × 600	dots
Pixel Pitch(W×H)	0.2175 × 0.2088	mm
Colors	16.7M	---
Backlight Type	27 white leds 9.6V/180mA typ 225mA max	---
Interface Type	MIPI	---



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### 3. Pin Descriptions

Pin No.	Symbol	Functional	Notes
1	LED+	Back light LED+	
2	LED+	Back light LED+	
3	VGH	Gate ON Voltage	
4	VGL	Gate OFF Voltage	
5	U/D	Gate up or down scan control	
6	Vcom	Common voltage	
7	LED-	Back light LED-	
8	LED-	Back light LED-	
9	AVDD	Power for Analog Circuit	
10	GND	Ground	
11	MIPI_TDP3	MIPI data input	
12	MIPI_TDN3	MIPI data input	
13	GND	Ground	
14	MIPI_TDP2	MIPI data input	
15	MIPI_TDN2	MIPI data input	
16	GND	Ground	
17	MIPI_TDP	MIPI clock input	
18	MIPI_TDN	MIPI clock input	
19	GND	Ground	
20	MIPI_TDP1	MIPI data input	
21	MIPI_TDN1	MIPI data input	
22	GND	Ground	
23	MIPI_TDP0	MIPI data input	
24	MIPI_TDN0	MIPI data input	
25	GND	Ground	
26	STBYB	Standby mode, Normally pulled high	
27	RESET	Global reset pin	
28-29	NC	No connection	
30	VDD	Power supply for digital circuits +1.8V input	

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#### 4. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Power supply1	V <sub>DD</sub>	-0.3	+2.5	V
Power supply2	A <sub>vdd</sub>	-0.5	+13.5	V
Operating temperature	T <sub>OPR</sub>	-10	50	°C
Storage temperature	T <sub>STG</sub>	-20	60	°C

#### 5. Input driver voltage for LCD

parameter	Typ	Unit	remark
VDD	<b>1.8</b>	V	Temperature:25 °C ±2
VGH	18	V	
VGL	-6	V	
AVDD	9.6	V	
*VCOM	4	V	

Note: Please adjust Vcom to make the flicker level be minimum

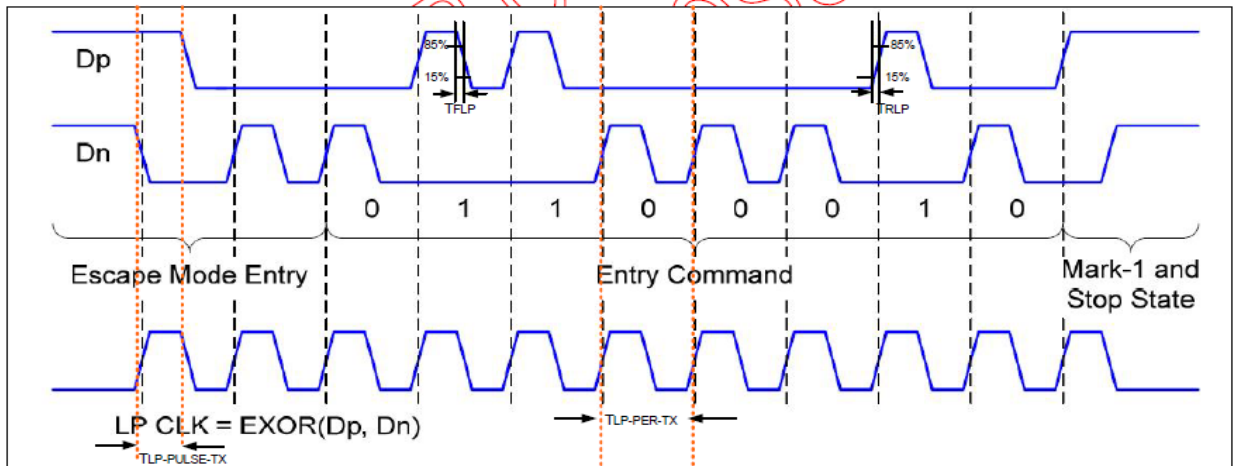
#### 6. MIPI DC Characteristics

(VDD=VDD\_IF=1.8V,AVDD=8 to 13.5V,GND=AGND=GND\_IF=0V,TA=-20°C to 85°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
MIPI Characteristics for High Speed Receiver					
Single-ended input low voltage	V <sub>LHS</sub>	-40	-	-	mV
Single-ended input high voltage	V <sub>HHS</sub>	-	-	460	mV
Common-mode voltage	V <sub>CDRXDC</sub>	70	-	330	mV
Differential input impedance	Z <sub>ID</sub>		100		ohm
HS transmit differential voltage(VOD=VDP-VDN)	VOD	140	200	250	mV
MIPI Characteristics for Low Power Mode					
Pad signal voltage range	V <sub>I</sub>	-50		1350	mV
Ground shift	V <sub>GNDSH</sub>	-50	-	50	mV
Logic 0 input threshold	V <sub>IL</sub>	0		550	mV
Logic 1 input threshold	V <sub>IH</sub>	880		1350	mV
Input hysteresis	V <sub>HYST</sub>	25	-	-	mV
Output low level	V <sub>OL</sub>	-50	-	50	mV
Output high level	V <sub>OH</sub>	1.1	1.2	1.3	V
Output impedance of Low Power Transmitter	Z <sub>OLP</sub>	80	100	125	ohm
Logic 0 contention threshold	V <sub>ILCD,MAX</sub>	-	-	200	mV
Logic 0 contention threshold	V <sub>IHCD,MIN</sub>	450	-	-	mV

## 7. MIPI AC Characteristics

Parameter	Symbol	Min	Typ	Max	Units	Notes
15%~85% rising time and falling time	$T_{RLP} / T_{FLP}$	-	-	25	ns	-
30%~85% rising time and falling time	$T_{REOT}$	-	-	35	ns	-
Pulse width of LP exclusive-OR clock	First LP EXOR clock pulse after STOP state or Last pulse before stop state	40	-	-	ns	-
	All other pulses	20	-	-	ns	-
Period of the LP EXOR clock	$T_{LP-PER-TX}$	90	-	-	mV/ns	-
Slew Rate @CLOAD =0pF	$\delta V / \delta t_{SR}$	30	-	500	mV/ns	-
Slew Rate @CLOAD =5pF		30	-	200	mV/ns	-
Slew Rate @CLOAD =20pF		30	-	150	mV/ns	-
Slew Rate @CLOAD =70pF		30	-	100	mV/ns	-
Load Capacitance	$T_{RLP}$	-	-	70	pF	-

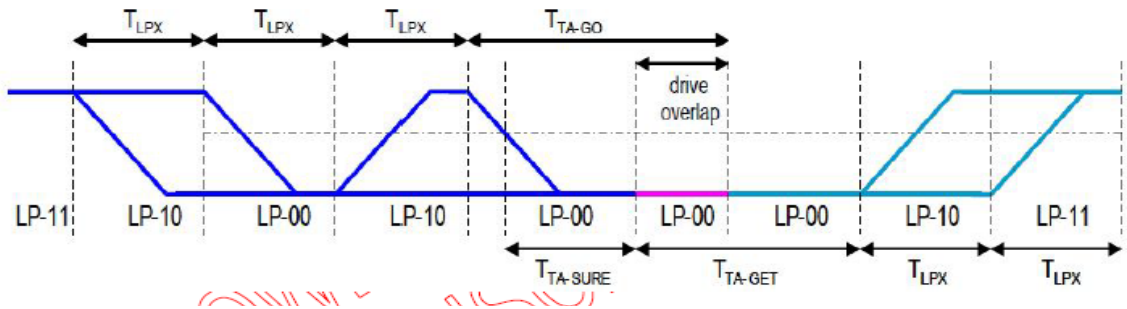


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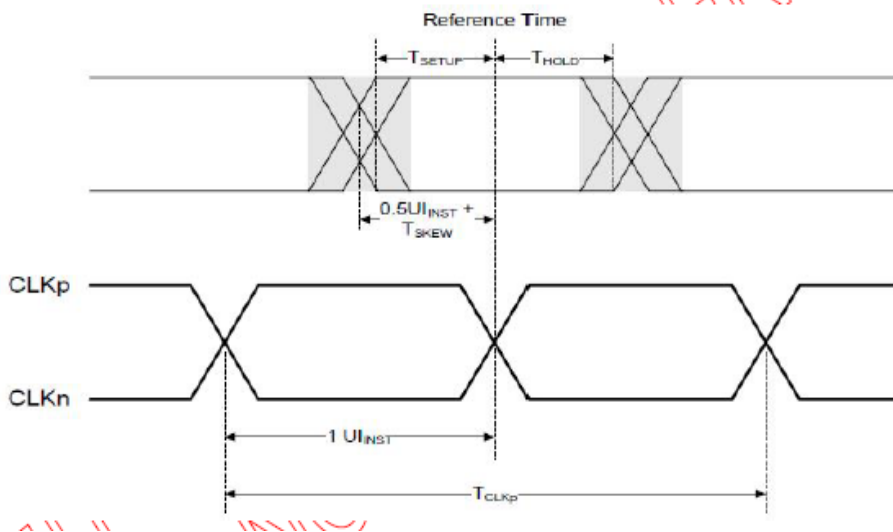
Turnaround Procedure Operation Timing Parameters

Parameter	Symbol	Min	Typ	Max	Units
Length of any Low-Power state period: Master side	$T_{LPX}$	50	-	75	ns
Length of any Low-Power state period: Slave side	$T_{LPX}$	50	55.56	58.34	ns
Ratio of $T_{LPX}$ (Master)/ $T_{LPX}$ (Slave) between Master and Slave side	Ratio $T_{LPX}$	2/3	-	3/2	
Time-out before new TX side start driving	$T_{TA-Sure}$	$T_{LPX}$	-	$2T_{LPX}$	ns
Time to drive LP-00 by new TX	$T_{TA-GET}$	-	$5T_{LPX}$	-	ns
Time to drive LP-00 after Turnaround Request	$T_{TA-GO}$	-	$4T_{LPX}$	-	ns



### High speed transmission

Parameter	Symbol	Min	Typ	Max	Units
UI instantaneous	$UI_{INST}$	2	-	12.5	ns
Data to Clock Skew(measured at transmitter)	$T_{SKEW(TX)}$	-0.15	-	0.15	$UI_{INST}$
Data to Clock Setup time(measured at receiver)	$T_{SETUP(RX)}$	0.15	-	-	$UI_{INST}$
Data to Clock Hold time(measured at receiver)	$T_{HOLD(RX)}$	0.15	-	-	$UI_{INST}$
20%~80% rise time and fall time	$T_R, T_F$	150	-	-	ps
		-	-	0.3	$UI_{INST}$

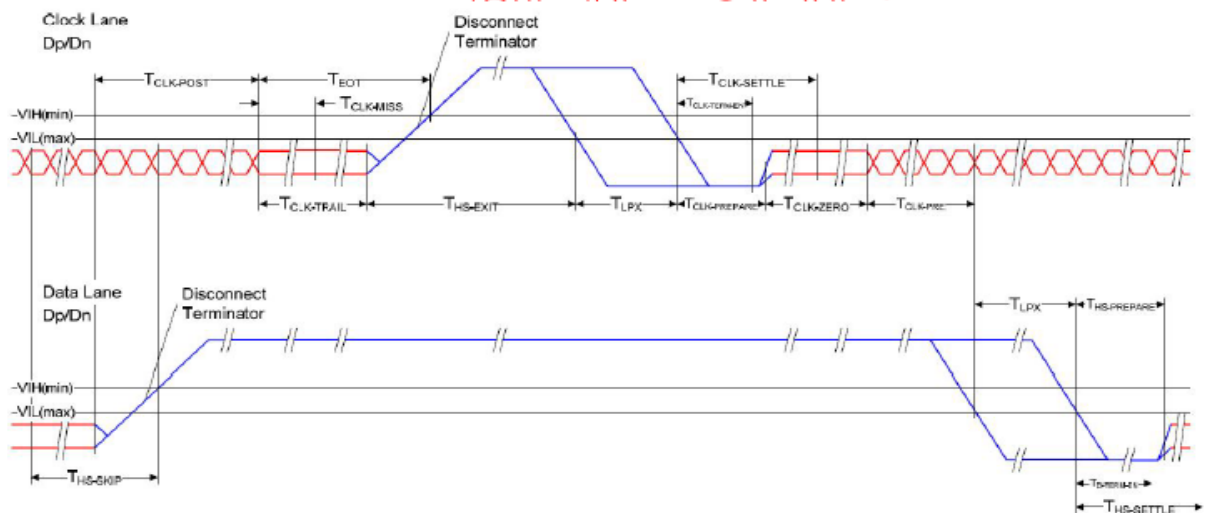


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### High Speed Clock Transmission

Parameter	Symbol	Min	Typ	Max	Units
Time that the transmitter shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode	TCLK-POST	60+52UI	-	-	ns
Detection time that the clock has stopped toggling	TCLK-MISS	-	-	60	ns
Time to drive LP-00 to prepare for HS clock transmission	TCLK-PREPARE	38	-	95	ns
Minimum lead HS-0 drive period before starting clock	TCLK-PREPARE + TCLK-ZERO	300	-	-	ns
Time to enable Clock Lane receiver line termination measured from when Dn cross $V_{IL,MAX}$	THS-TERM-EN	-	-	38	ns
Minimum time that the HS clock must be prior to any associated data lane beginning the transmission from LP to HS mode	TCLK-PRE	8	-	-	UI
Time to drive HS differential state after last payload clock bit of a HS transmission burst	TCLK-TRAIL	60	-	-	ns





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## 8. Resolution 1024x600

DE mode

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	40.8	51.2	67.2	Mhz
Horizontal display area	thd	1024			DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	Tvd	600			H
VSYNC period time	Tv	610	635	800	H
VSYNC blanking	Tvb+Tvfp	10	35	200	H

HV mode

Horizontal input timing

Parameter	Symbol	Value			Unit
Horizontal display area	thd	1024			DCLK
DCLK frequency@ Frame rate=60hz	fclk	Min.	Typ.	Max.	Mhz
		44.9	51.2	63	
1 Horizontal Line	th	1200	1344	1400	DCLK
HSYNC pulse width	thpw	Min.	1		
		Typ.	-		
		Max.	140		
HSYNC blanking	thb	160	160	160	
HSYNC front porch	thfp	16	160	216	

HV mode

Vertical input timing

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	600			H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tvpw	1	-	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H

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### 9. Backlight Characteristic

Item	Symbol	Min	Typical	Max	Unit
LED module Forward voltage	$V_{LED}$	--	9.6	---	V
LED module current	$I_{LED}$	--	--	225	mA
L/G Surface Luminance ★1	$L_s$	--	TBD	--	mcD
LCM Surface brightness uniform ★2	$L_D$	80	--	--	%

★ 1 Test condition is:

(a) Center point on active area.

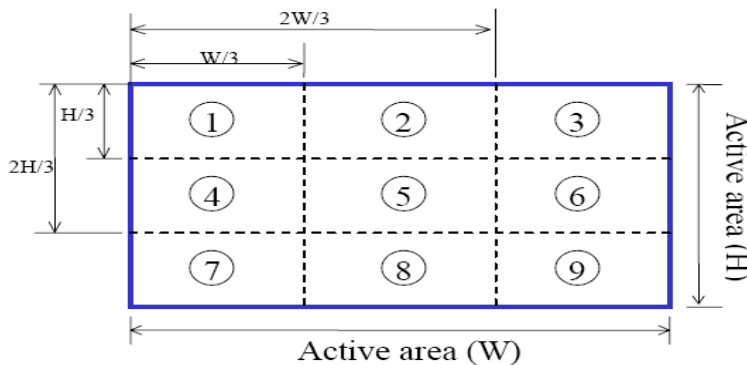
(b) Best Contrast.

★2 Uniform measure condition:

(1) Measure 9 point. Measure location show below;

(2)  $Uniform = (Min. \text{ brightness} / Max. \text{ brightness}) * 100\%$

(3) Best Contrast.



### 10. Electro-optical Characteristics

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Hor.	$\phi 3$	$CR \geq 10$		70		Deg.	
		$\phi 9$			70		Deg.	
	Ver.	$\phi 12$			60		Deg.	
		$\phi 6$			70		Deg.	
Color gamut (C light)					50		%	
Luminance Contrast ratio		T (%)	$\phi 0^\circ$		600			
Response Time		$T_{RT}$	Temp=25° C		8		ms	

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### 11. Reliability

#### 11.1 Mtbf

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal

#### 11.2 Test condition

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Non-Operating Test	60°C*240Hrs	。 No Defect Of Operational Function In Room Temperature Are Allowable
2	Low Temperature Non-Operating Test	-20°C*240Hrs	
3	High Temperature/Humidity Non Operating Test	60°C*90%RH*240Hrs	
4	High Temperature Operating Test	50°C*240Hrs	
5	Low Temperature Operating Test	-10°C*240Hrs	
6	Thermal Shock Test	-10 °C (30Min) -50 °C (30Min) *10CYCLES	。 IDD of LCM in Pre-and Post-Test Should Follow Specification

Notes:

1. Judgments should be made after exposure in room temperature for two hours.
2. The distill water is used for the high temperature/humidity test.
3. The sample above is individually for every reliability tests condition.

### 12. Inspection standards

1.AQL(Acceptable Quality Level)

AQL of major and minor defect.

	MAJOR DEFECT	MINOR DEFECT
AQL	0.65	1.5

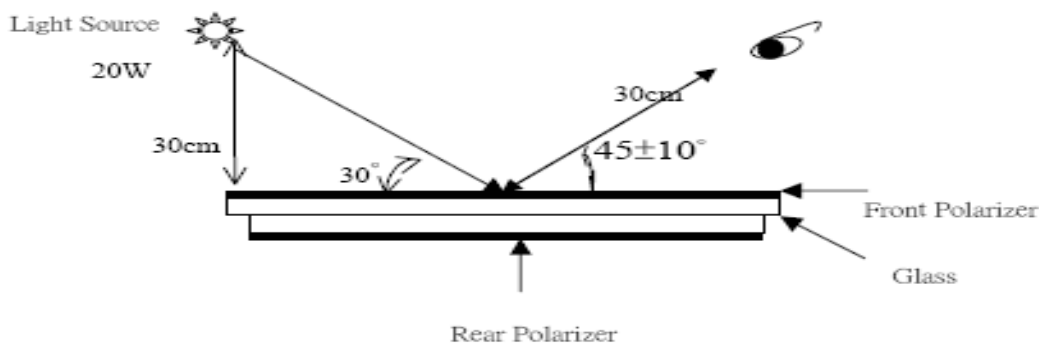
#### 2. Basic conditions for inspection

The LCM face to us, in normal environment, the lux is 1000±200.(Darkroom's lux: 100±50),About an angle of incidence 30,a distance of 30 cm with an angle of 45 degree to check the products without uncovering the film!

(As shown below)

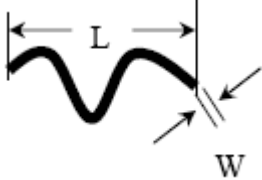
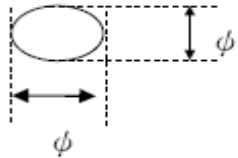
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### 3. Inspection item and criteria

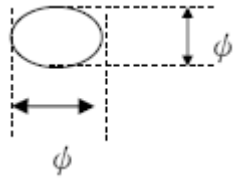
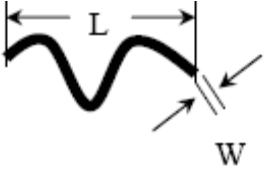
#### 3.1 LCD appearance defect(View area)

NO	Defect item	Criteria		Remark
		Specification	Allowable	
1	Fiber、 glass cratch、 polarizer scratch/folded (minor defect)	$W \leq 0.03\text{mm}$	disregard	note1:L: Length, W: Width note2: disregard if out of AA 
		$0.03\text{mm} < W \leq 0.05\text{mm};$ $L \leq 3.0\text{mm}$	2	
		$0.05\text{mm} < W \leq 0.1\text{mm};$ $L \leq 3.0\text{mm}$	1	
		$W > 0.1\text{mm}; L > 3.0\text{mm}$	0	
2	Polarizer bubble、 concave and convex (minor defect)	$\phi \leq 0.2\text{mm}$	disregard	note1: $\phi = (L+W)/2$ , L:Length, W :Width note2:disregard if out of AA
		$0.2\text{mm} < \phi \leq 0.3\text{mm}$	2	
		$0.3\text{mm} < \phi \leq 0.5\text{mm}$	1	
		$0.5\text{mm} < \phi$	0	
3	Black dots、 dirty dots、 impurities、 eye winker (minor defect)	$\phi \leq 0.15\text{mm}$	disregard	note2:disregard if out of AA 
		$0.15\text{mm} < \phi \leq 0.25\text{mm}$	2	
		$0.25\text{mm} < \phi \leq 0.3\text{mm}$	1	
		$0.3\text{mm} < \phi$	0	
4	Polarizer prick (minor defect)	$\phi \leq 0.1\text{mm}$	disregard	note1: $\phi = (L+W)/2$ , L=Length, W=Width note2:the distance between two dots>5mm
		$0.1\text{mm} < \phi \leq 0.25\text{mm}$	3	
		$\phi > 0.25\text{mm}$	0	

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### 3.2 Electrical criteria

NO	Defect item	Criteria	Remark	
1	No display (major defect)	No display 【Reject】		
2	Missing line (major defect)	Missing line 【Reject】		
3	Seg-com light and dark (major defect)	Seg-com light and dark 【Reject】	ND filter 2% test	
4	No display in immobility (major defect)	No display in immobility 【Reject】		
5	Flicker of Pattern (major defect)	Flicker of Pattern 【Reject】		
6	Mura (major defect)	ND filter 2% test		
7	Over current (major defect)	Over current 【Reject】		
8	Voltage out of specification (major defect)	Voltage out of specification 【Reject】		
9	Pattern blur, error code (major defect)	Pattern blur, error code 【Reject】		
10	Dark light, Flicker (major defect)	Dark light, Flicker 【Reject】		
11	Black/white dots 、 Dirty dots、 eye winker (major defect)	Specification	Allowable	Note1:disregard if out of AA 
		$\phi \leq 0.15\text{mm}$	disregard	
		$0.15\text{mm} < \phi \leq 0.25\text{mm}$	2	
		$0.25\text{mm} < \phi \leq 0.3\text{mm}$	1	
	$0.3\text{mm} < \phi$	0		
12	Fiber、glass crutch、Polarizer scratch/folded (major defect)	$W \leq 0.03\text{mm}$	disregard	Note1:L: Length, W: Width Note2: disregard if out of AA 
		$0.03\text{mm} < W \leq 0.05\text{mm}$ $L \leq 3.0\text{mm}$	2	
		$0.05\text{mm} < W \leq 0.1\text{mm}$ $L \leq 3.0\text{mm}$	1	
		$W > 0.1\text{mm}; L > 3.0\text{mm}$	0	

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### 13.Precautions for using LCD modules.

#### 13.1 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.

#### 13.2 Storage Conditions

- (4) Store the panel or module in a dark place where the temperature is  $23 \pm 5^{\circ}\text{C}$  and the humidity is below  $45 \pm 20\% \text{RH}$ .
- (5) Store in anti-static electricity container.
- (6) Store in clean environment, free from dust, active gas, and solvent.
- (7) Do not place the module near organics solvents or corrosive gases.
- (8) Do not crush, shake, or jolt the module.

#### 13.3 Handling Precautions

- (9) Avoid static electricity, which can damage the CMOS LSI.
- (10) The polarizing plate of the display is very fragile, please handle it very carefully.
- (11) Do not give external shock.
- (12) Do not apply excessive force on the surface.
- (13) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (14) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (15) Do not operate it above the absolute maximum rating.
- (16) Do not remove the panel or frame from the module.

#### 13.4 Warranty

The period is within twelve months since the date of shipping out under normal using and storage conditions.