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1. General Description

7003B-D is a 800RGB*480 dots matrix TFT LCD module. It has a TFT panel composed of 800 sources and 480 gates. The LCM can be easily accessed by micro-controller.

2. Features

Display Mode	Transmissive
	a-TFT
Display Format	Graphic 800RGB*480 Dot-matrix
Input Data	RGB interface
Viewing Direction	Free
Drive	OTA7001A_V03

3. Mechanical Specification

Item	Specifications	Unit
Dimensional outline	164.9(W)*100(H)*3.4MM (FPC not include)	mm
Resolution	800RGB*480	dots
LCD Active area	151.68(W)*85.92(H)	mm
Pixel size	0.063(W)*0.179(H)	mm

5. Maximum Ratings

Item	Symbol	Min	Max	Unit	Note
Supply voltage	V	3.0	3.6	V	
Operating temperature	T _{OPR}	-10	60	℃	
Storage temperature	T _{STR}	-20	70	℃	

6. Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	Logic V _{CC}		2.7	3.3	3.5	V
Input Voltage	H level T _{IH}		0.8*IOVCC		IOVCC	V
	L level T _{IL}		-0.3		0.2* IOVCC	
Storage temperature	I _{DD} I _{ACC}	V _{CC} =3.3V; T _{emp} =25℃ /DCLK=9MHz		8.9		mA

7. Backlight Characteristic

Item	Symbol	Min	Typical	Max	Unit
LED module Forward voltage	V _{LED}	21	22.4	23.8	V
LED module current	I _{LED}		40		mA
L/G Surface Luminance ★1	L _S	4200	4600		Cd/m ²
LCM Surface brightness uniform ★2	L _D	80			%

★ 1Test condition is:

- (a) Center point on active area.
- (b)Best Contrast.

★2Uniform measure condition:

- (1)Measure 9 point. Measure location show below;
- (2)Uniform=(Min. brightness /Max. brightness) *100%
- (3)Best Contrast.

8. Module Function Description

8.1 Pin Descriptions

Pin No.	Symbol	Functional	Notes
1	LED K	LED Cathode	
2	LED A	LED Anode	
3	GND	Digital Ground	
4	VDD	Digital Power	
5~12	R0~R7	Red data Input	
13~20	G0~G7	Green data Input	
21~28	B0~B7	Blue data Input	
29	GND	Digital Ground	
30	DCLK	Clock input	
31	DISP	Display on/off	
32	HSYNC	Horizontal sync input.Negative polarity	
33	VSYNC	Vertical sync input.Negative polarity	
34	DE	Data enable signal	
35	NC	Not connect	
36	GND	Digital Ground	
37	XR	TP X_Right	
38	YD	TP Y_Bottom	
39	XL	TP X_Left	
40	YU	TP Y_Up	

8.2 Timing characteristics.

I80-System Interface Timing Characteristics

Normal Write Mode($IOVCC=1.65\sim 3.3V, V_{CC}=2.4\sim 3.3V$)

Item		Symbol	Unit	Min.	Typ.	Max.	Test Condition
Bus cycle time	Write	t_{CYCW}	ns	100			
	Read	t_{CYCR}	ns	300			
Write low-level pulse width		PW_{LM}	ns	50		500	
Write high-level pulse width		PW_{HW}	ns	50			
Read low-level pulse width		PW_{LR}	ns	150			
Read high-level pulse width		PW_{HR}	ns	150			
Write/ Read rise/fall time		t_{WRf}/t_{WRr}	ns			25	
Setup time	Write(RS to nCS,E/nWR)	ns	ns	10			
	Read (RS to nCS,E/nWR)	ns	ns	5			
Address hold time		T_{AH}	ns	5			
Write data set up time		t_{osw}	ns	10			
Write data hold time		t_H	ns	15			
Read data set up time		t_{DDP}	ns			100	
Read data hold time		t_{OHR}	ns	5			

Read Timing Characteristics

Reset Timing Characteristics($V_{CC}=1.8\sim 3.3V, IOVCC=1.65\sim 3.3V$)

Item	Symbol	Unit	Min.	Typ.	Max
Reset low-level width	t_{RES}	ms	1		
Reset rise time	t_{RES}	μs			10

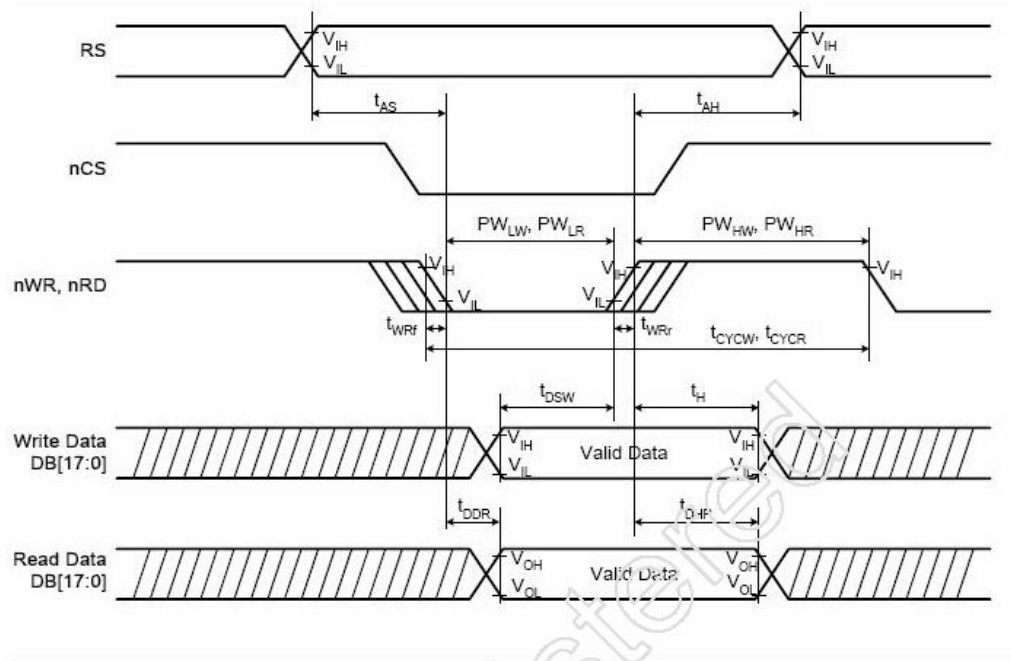
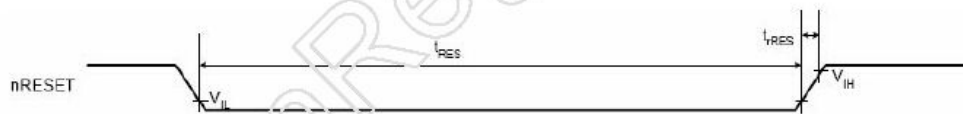


Figure 51 i80-System Bus Timing



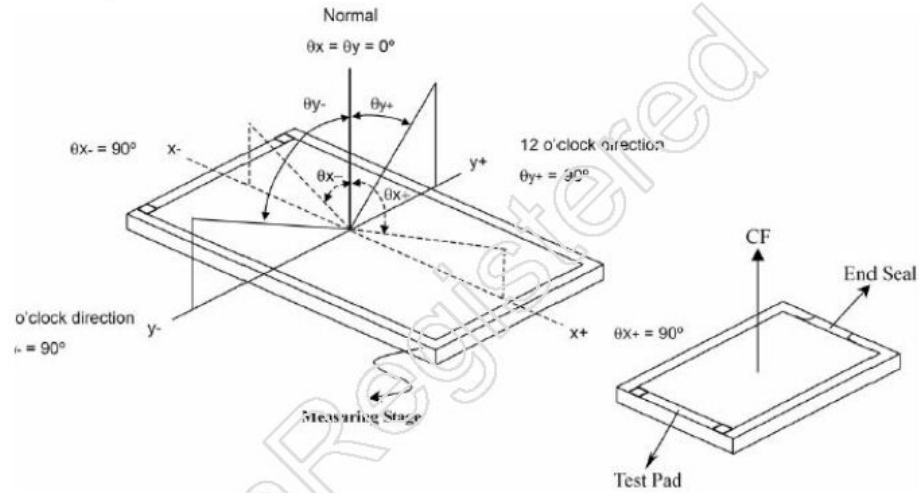
Reset Timing

9. Electro-optical Characteristics

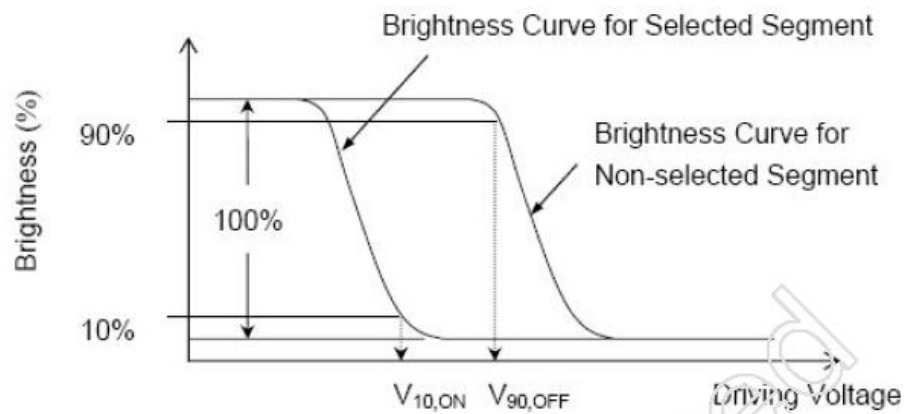
Item	Symbol	Conditions	Temp	Min.	Typ.	Max.	Unit	Note
Response Time	T_R	$\theta = \phi = 0$	25°C		TBD	TBD	msec	NOTE2
	T_F				TBD	TBD		
Viewing Angle Range	$\phi = 0^\circ (6^\circ)$	$\phi = 90^\circ (3^\circ)$	$\phi = 180^\circ (12^\circ)$			$\phi = 270^\circ (9^\circ)$		NOTE3
$\theta (25^\circ\text{C}) \text{ CR} \geq 10$	TBD	TBD	TBD			TBD		NOTE3

The above "viewing angle" is the measuring position with the largest contrast ratio. Not for good image quality. Viewing direction for good image quality is 12 O'clock.

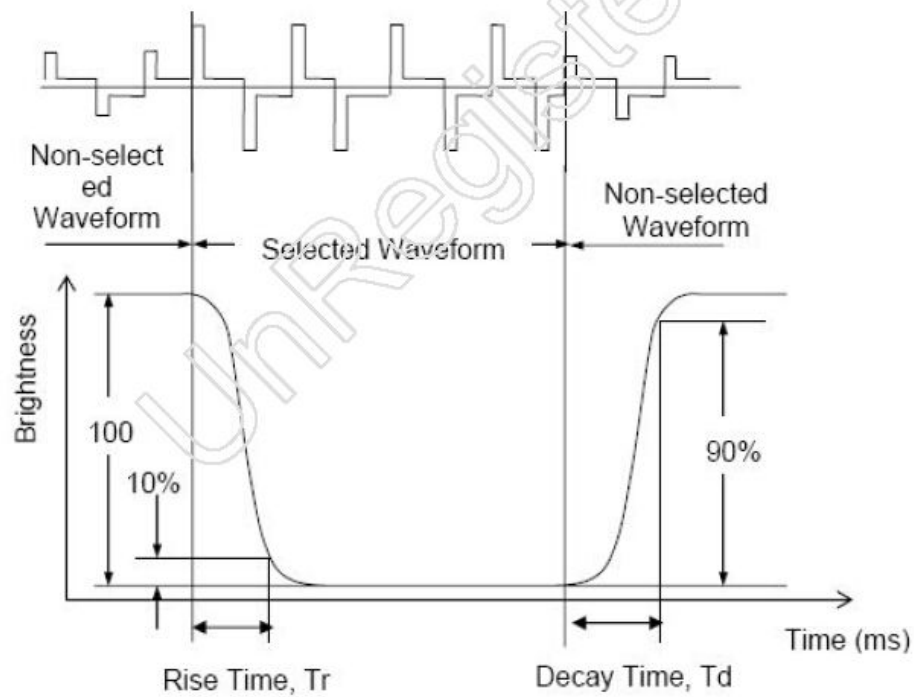
- For panel only
- Electro Optical Characteristics Test Method



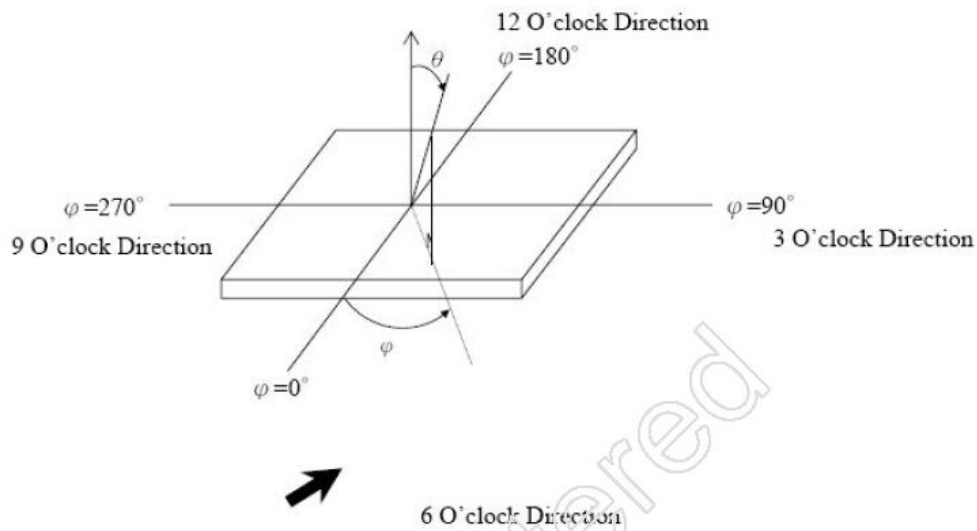
$$V_{op} = (V_{10, ON} + V_{90, OFF})/2$$



.Note2.Definition of Optical Response Time:

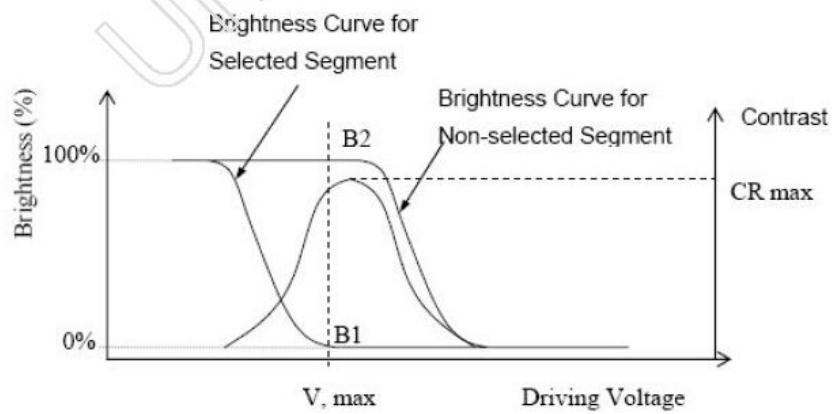


.Note3.Definition of Viewing Angle θ and ϕ :



Note4.Definition of Contrast ratio (CR):

$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$



10. Reliability

10.1Mtbf

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

10.2Test condition

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Non-Operating Test	80℃*240Hrs	No Defect Of Operational Function In Room Temperature Are Allowable
2	Low Temperature Non-Operating Test	-30℃*240Hrs	
3	High Temperature/Humidity Non Operating Test	60℃*90%RH*240Hrs	
4	High Temperature Operating Test	70℃*240Hrs	IDD of LCM In Pre and Post Test Should Follow Specification
5	Low Temperature Operating Test	-20℃*240Hrs	
6	Thermal Shock Test	-20℃ (30Min) ↔ 70℃ (30Min) *10CYCLES	

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.

11.Inspection standards

1.AQL(Acceptable Quality Level)

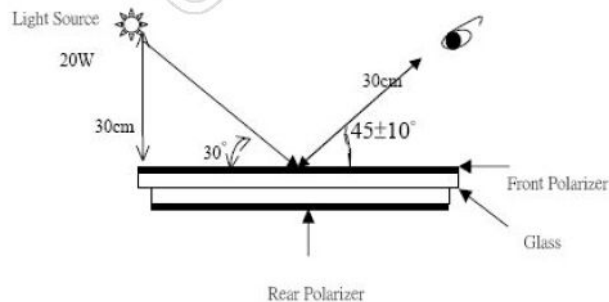
AQL of major and minor defect.

	MAJOR DEFECT	MINOR DEFECT
AQL	0.65	1.5

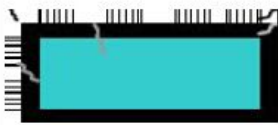
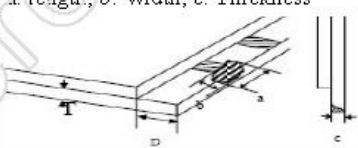
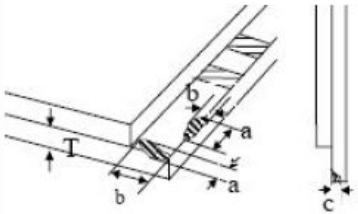
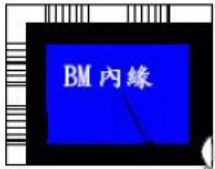
2. Basic conditions for inspection

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)

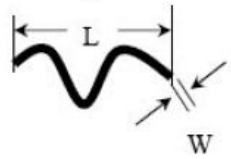
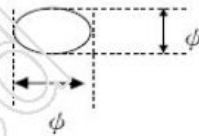


3.1.1Glass defect

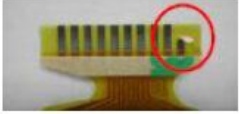
NO	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	
2	Cracks (Major defect)	1. Linear cracks panel 【Reject】 2. Nonlinear crack contrast by limited sample	
3	Glass extrude the conductive area (minor defect)	a: disregards and no influence assemblage. 1) $b \leq 1/3$ Pin width(non bonding area) 【Accept】 2) bonding area $\leq 0.5\text{mm}$ 【Accept】	A: Length, b: Width
4	Pin-side ,conductive area damaged (minor defect)	(a c: disregards) $b \leq 1/3$ of effective length for bonding electrode 【Accept】	a: length, b: Width, c: Thickness 
5	Pin-side,non-conductive area damaged (minor defect)	1)Damage area don't touch the ITO (Including contraposition mark, except scribing mark) 【Accept】 2) $C \leq T$ $b \leq 1/3$ of width 【Accept】 3) $c \leq T$ b not touch the seal glue 【Accept】 4)a disregards	a: Length, b: Width c: Thickness 
6	Non-pin-side damage (minor defect)	$c \leq T$ 1) b exceeds $1/3B_m$ 【Reject】 $c = T$ b not touch the seal glue 【Reject】	c: Thickness b: width of  damage

3.1.2LCD appearance defect(View area)

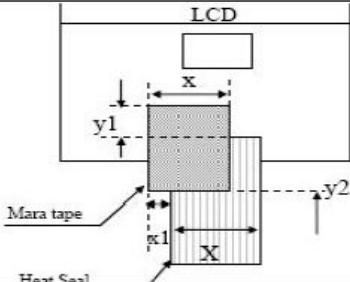
NO	Defect item	Criteria		Remark
1	Fiber、glass	Specification	Allowable	note1:L: Length, W: Width

	crack、polarizer scratch/folded (minor defect)	$W \sim 0.03\text{mm}$	disregard	note2: disregard if out of AA 
		$0.03\text{mm} < W \sim 0.05\text{mm}$ $L \sim 3.0\text{mm}$	2	
		$0.05\text{mm} < W \sim 0.1\text{mm}$ $L \sim 3.0\text{mm}$	1	
		$W > 0.1\text{mm}; L > 3.0\text{mm}$	0	
2	Polarizer bubble、 concave and convex (minor defect)	$\phi \sim 0.2\text{mm}$	disregard	note1: $\phi = (L \cdot W) / 2$, L:Length, W:Width note2: disregard if out of AA
		$0.2\text{mm} < \phi \sim 0.3\text{mm}$	2	
		$0.3\text{mm} < \phi \sim 0.5\text{mm}$	1	
		$0.5\text{mm} < \phi$	0	
3	Black dots、dirty dots、 impurities、eye winker (minor defect)	$\phi \sim 0.15\text{mm}$	disregard	note2: disregard if out of AA 
		$0.15\text{mm} < \phi \sim 0.25\text{mm}$	2	
		$0.25\text{mm} < \phi \sim 0.3\text{mm}$	1	
		$0.3\text{mm} < \phi$	0	
4	Polarizer prick (minor defect)	$\phi \sim 0.1\text{mm}$	disregard	note1: $\phi = (L \cdot W) / 2$, L=Length, W=Width note2: the distance between two dots>5mm
		$0.1\text{mm} < \phi \sim 0.25\text{mm}$	2	
		$\phi > 0.25\text{mm}$	0	

3.1.3FPC

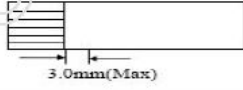
NO	Defect item	Criteria		Remark
1	Copper screen peel (minor defect)	Copper screen peel	【Reject】	
2	No release tape or peel	No release tape or peel	【Reject】	
3	Dirty dot and impurity of FPC for customer using side (minor defect)	Specification $\phi \sim 0.25\text{mm}$ $\phi > 0.25$	Allowable 2 0	Note1: Cannot have stride ITO impurities

3.1.4Black tape & Mara tape

NO	Defect item	Criteria	Remark
1	FPC or H/S black tape (minor defect)	1. shift spec: 1) glue to the polarize 【Reject】 2) IC bare 【Reject】 2. left-and-right spec: 1) exceed of FPC edge or H-S edge 【Reject】 2) IC bare 【Reject】	

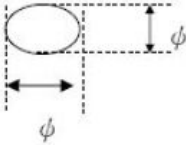
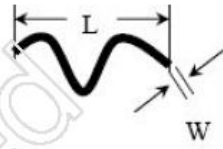
2	No black tape (major defect)	No black tape 【Reject】	
3	Tape position mistake (minor defect)	Not by engineering drawing	
4	Mara tape defect (minor defect)	Peel before pulling the protecting film 【Reject】	

3.1.5Silicon and Taffy glue

NO	Defect item	Criteria	Remark
1	Quantity of silicon (major defect)	Uncover the ITO and circuit area 【Reject】	note: compared by engineering
2	Taffy glue (major defect)	1.Uncover the reveal copper area【Reject】 2.Cover layer 0.3mm(Min)~3.0mm(Max) 【Reject】	note: if customer has special requirement, refer to the technical document 
3	Depth of glue covering (major defect)	Depth of glue covering ovetop front Polarizer 【Reject】	Except of the special requirement

3.2Electrical 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	

12. Precautions for using LCD modules.

12.1 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.

12.2 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%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 joint the module.

12.3 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 ketonic 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.

12.4Warranty

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

13.Factory

FACTORY NAME:

FACTORY ADDRESS:

FACTORY PHONE:

14.Revision history

Version	Revise record	Date
A	Original version	