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SPECIFICATION FOR LCD MODULE

客户名称(Customer): _____

产品名称(Product) : 4.3寸液晶显示屏

产品型号(Description): TB043-14008S49A-00

Compile by 编制	Checked 审核	Approved 批准

Customer Approve (客户确认)	QC品质	R&D研发	Approved批准



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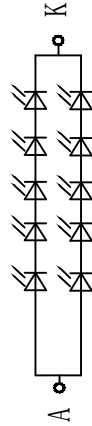
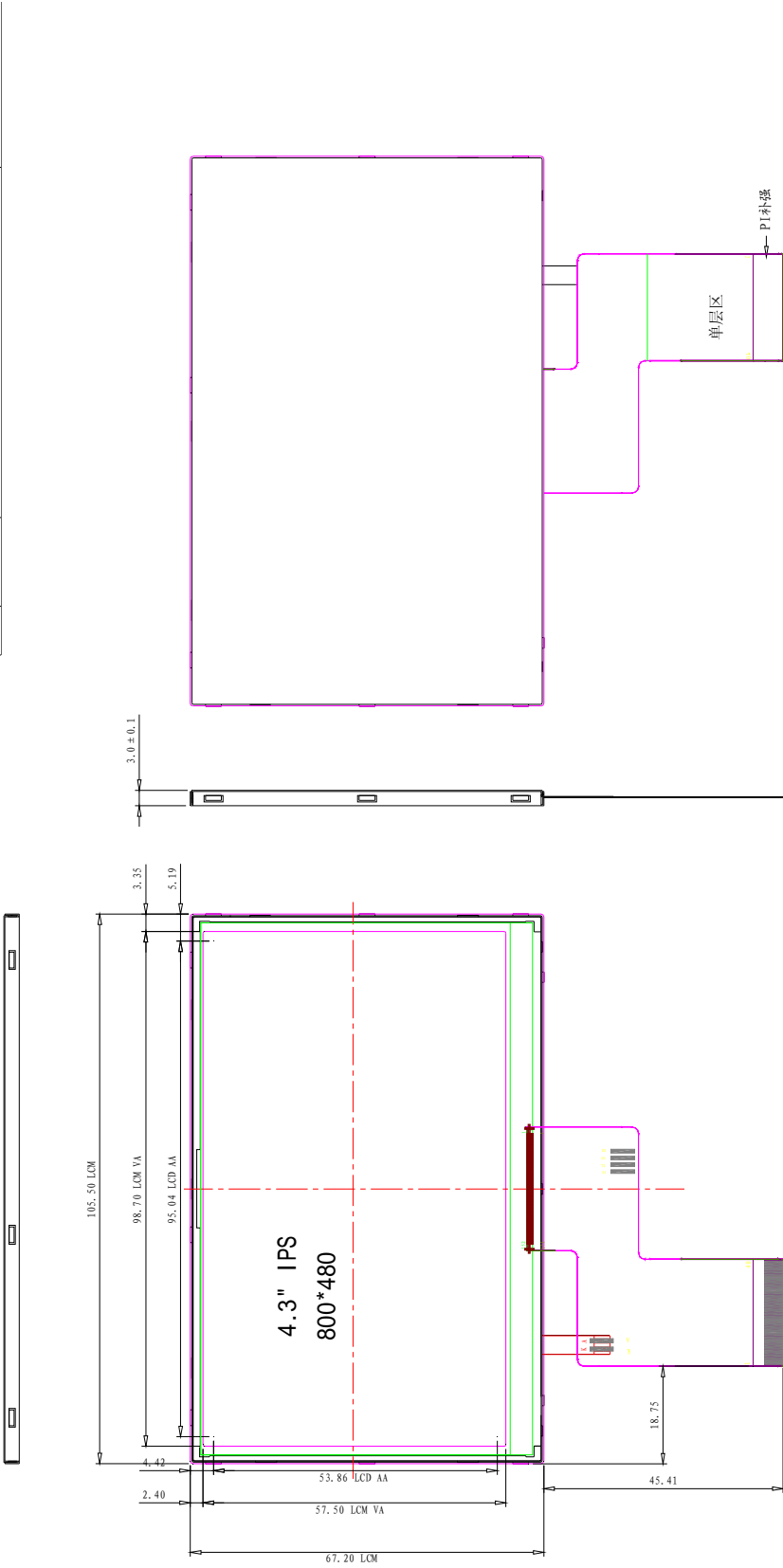
1. General Description

TB043-I4010S49A-00 is a 800RGB*480 dots matrix TFT LCD module.

Item	Display Panel	Remark
Display Mode	Normally White, Transmissive LCD	
Viewing Direction	ALL O'CLOCK	
Interface	RGB 24bit	
Outside Dimensions	105.5mm(H)*67.2mm(V)*3.0mm(T)	
Active Area	95.04mm(H) × 53.856mm(V)	
Number of Pixels	800×RGB×480Pixels	
Pixel Pitch	0.1188mm(H) × 0.1122mm(V)	



REV.	ECN No.	DESCRIPTION	DRAWN BY



- NOTE:
1. LCD TYPE : 4.3" TFT
 2. DRIVER IC :
 3. VIEWING DIRECTION : IPS
 4. BACKLIGHT: WHITE LED 10 CHIPS Parallel
 5. OPERATION TEMP : -20°C~70°C
 6. STORAGE TEMP : -30°C~80°C
 7. GENERAL TOLERANCE: ±0.2
 8. Connector :
 9. * IS IMPORTANT DIMENSION

TOLERANCE	SCALE	N.T.S	DRG DATE	MODEL:
X ±	UNITS	mm	21.05.22	800 (RGB) X480 DOTS
.XX ±	MATERIAL		DRG BY	TITLE:
± 1°			CHK BY	DWG NO
			APPROVED	P / N
				VER: 01

NO.	SIGNAL
1	LEDK
2	LEDA
3	GND
4	VCC
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	CLK
31	DISP
32	Hsync
33	Vsync
34	DEN
35	NC
36	GND
37	XR (NC)
38	YD (NC)
39	XL (NC)
40	YL (NC)



5. Maximum Ratings

Item	Symbol	Min	Max	Unit	Note
Supply voltage	V	3.2	5.8	V	
Operating temperature	T _{OPR}	-20	70	℃	
Storage temperature	T _{STR}	-30	80	℃	

6. Electrical Characteristics

Properties		Sym.	Min	Typ.	Max	Unit	Note
Supply Voltage		VCC	-0.3	3.3	+0.3	V	Note
		VGH	-0.3	21	-0.3	V	Note
		VGL	-0.3	-8	-0.3	V	
		AVDD	-0.3	10.5	-0.3	V	
		VCOM		4		V	NOT1
Logic Output Voltage	Low Voltage	VOL	0	-	0.1VDD	V	
	High Voltage	VOH	0.9VDD	-	VDD	V	
Power Consumption	White	P _{-w-}	T.B.D	T.B.D	T.B.D	mW	
	Black	P _{-b-}	T.B.D	T.B.D	T.B.D	mW	
	Vertical Stripe	P _{-v-}	T.B.D	T.B.D	T.B.D	mW	

NOTE1: VCOM 电压根据客户主板实际效果而定

7. Backlight Characteristic

Item	Symbol	Min	Typical	Max	Unit
LED module Forward voltage	V _{LED}	14	15.5	17	V
LED module current	V _{LED}	-	40	-	mA
Lcd Interface Luminance ★1	L _S		400		Cd/m ²
LCM Surface brightness uniform ★2	L _D	75	80		%

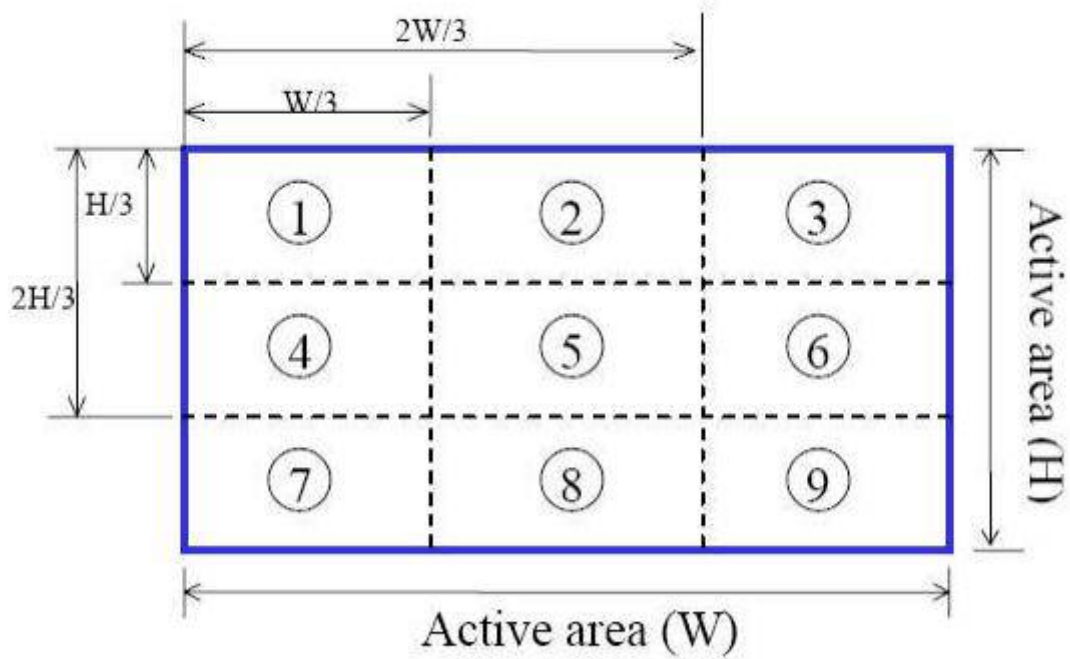
★ 1Test condition is:

(a) Center point on active area.

(b)Best Contrast.



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



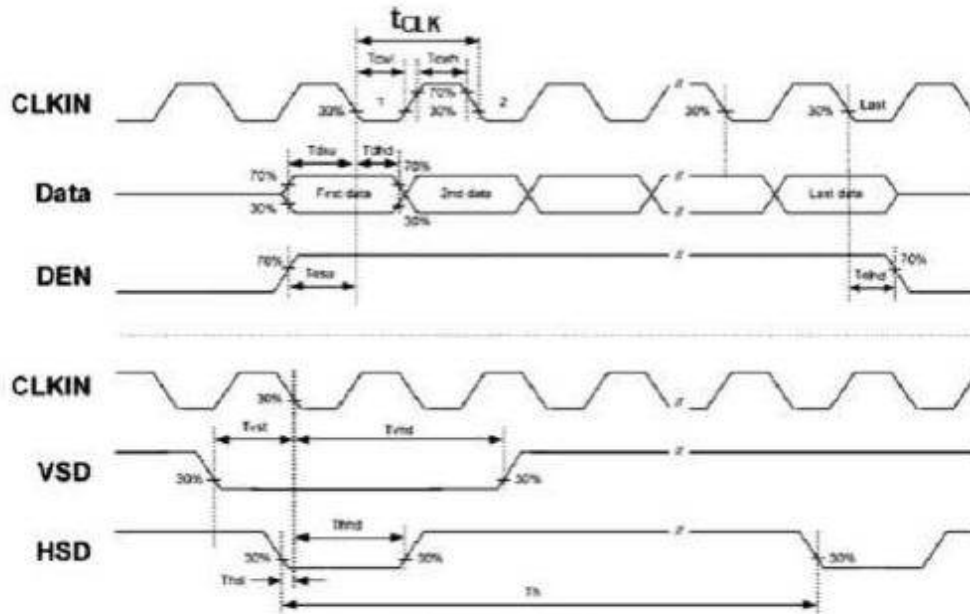


7. Pin Description

Pin NO.	Symbol	Description
1	LEDK	LED BACKLIGHT(CATHODE
2	LEDA	LED BACKLIGHT(ANODE
3	GND	GROUND
4	VCC	POWER SUPPLY
5	R0	RED DATA
6	R1	RED DATA
7	R2	RED DATA
8	R3	RED DATA
9	R4	RED DATA
10	R5	RED DATA
11	R6	RED DATA
12	R7	RED DATA
13	G0	GREEN DATA
14	G1	GREEN DATA
15	G2	GREEN DATA
16	G3	GREEN DATA
17	G4	GREEN DATA
18	G5	GREEN DATA
19	G6	GREEN DATA
20	G7	GREEN DATA
21	B0	BLUE DATA
22	B1	BLUE DATA
23	B2	BLUE DATA
24	B3	BLUE DATA
25	B4	BLUE DATA
26	B5	BLUE DATA
27	B6	BLUE DATA
28	B7	BLUE DATA
29	GND	GROUND
30	CLK	CLOCK SIGNAL
31	DISP	DISPLAY ON/OFF
32	HSYNC	HORIZONTAL SYNC INPUT IN RGB MODE
33	VSNC	VERTICAL SYNC INPUT IN RGB MODE
34	DEN	DATA ENABLE
35	NC	NC
36	GND	GROUND
37	XR(NC)	TOUCH PLANE PIN/NC
38	YD(NC)	TOUCH PLANE PIN/NC
39	XL(NC)	TOUCH PLANE PIN/NC
40	YU(NC)	TOUCH PLANE PIN/NC

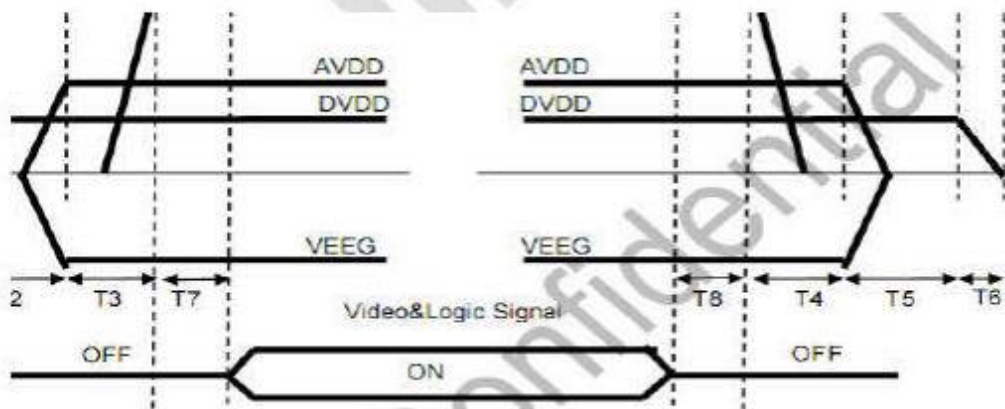


7.2 Timing characteristics.



Sampling clock timing

9.2. Power Sequence



- | | |
|---------------------|---------------------|
| $0 < T1 \cong 10ms$ | $T5 > 0ms$ |
| $T2 > 20ms$ | $T6 > 0ms$ |
| $T3 > 10ms$ | $0 < T7 \cong 10ms$ |
| $T4 > 0ms$ | $0 < T8 \cong 10ms$ |

Normal Write Mode(HWM='0'), IOVcc=1.65V~3.6V, Vcc=2.5V~3.6V



Parameter	Symbol	Unit	Min.	Max.	Unit
Bus cycle time write	t _{CYCW}	ns	100	-	-
Bus cycle time read	t _{CYCR}	ns	160	-	-
Write low-level pulse width	PW _{LOW}	ns	35	-	-
Read low-level pulse width	PW _{LR}	ns	45	-	-
Write high-level pulse width	PW _{HW}	ns	35	-	-
Read high-level pulse width	PW _{HR}	ns	90	-	-
Write/Read rise/fall time	t _{WR,WRF}	ns	-	-	25
Setup time Write	t _{AS}	ns	0	-	-
Setup time Read	t _{AS}	ns	10	-	-
Address hold time	t _{AH}	ns	2	-	-
Write data setup time	t _{DSW}	ns	25	-	-
Write data hold time	t _H	ns	5	-	-
Read data delay time	t _{DDR}	ns	-	-	100
Read data hold time	t _{DHR}	ns	5	-	-

Read Timing Characteristics

Reset Timing Characteristics(VCC=1.8-3.3V,IOVCC=1.65-3.3V)



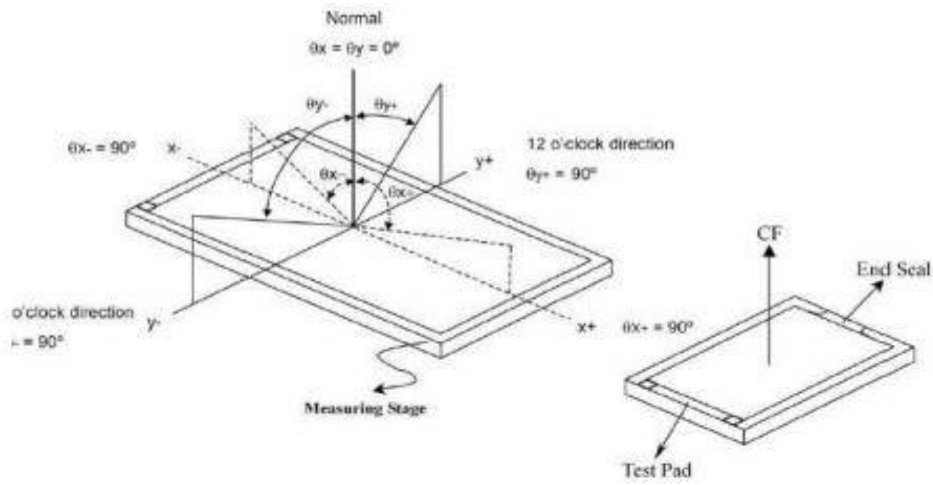
Item	Symbol	Unit	Min.	Typ.	Max
Reset low-level width	t _{RES}	ms	1		
Reset rise time	t _{RES}	μs			10

8. Electro-optical Characteristics

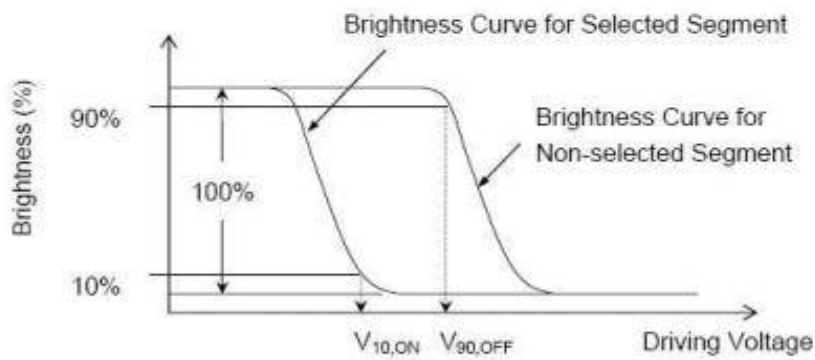
Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Θ3	CR>10	70	80	-	Deg.	Note1
		Θ9		70	80	-	Deg.	
	Vertical	Θ12		70	80	-	Deg.	
		Θ6		70	80	-	Deg.	
Contrast ratio		CR	Θ = 0°	900	1200	-		Note2
Transmittance		Tr		3.8	4.6	-	%	Note3
Color Gamut		CG		45	50	-	%	
Reproduction of color	Red	Rx	Θ = 0°	0.589	0.609	0.629		Note4 (Based on C Light)
		Ry		0.304	0.324	0.344		
	Green	Gx		0.291	0.311	0.331		
		Gy		0.535	0.555	0.575		
	Blue	Bx		0.129	0.149	0.169		
		By		0.121	0.141	0.161		
White Chromaticity		Wx	Θ = 0°	0.288	0.308	0.328		
		Wy		0.317	0.337	0.357		
Response Time (Rising + Falling)		T _r + T _f	Ta= 25° C Θ = 0°	-	30	40	ms	Note 5

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 ALLO'clock.

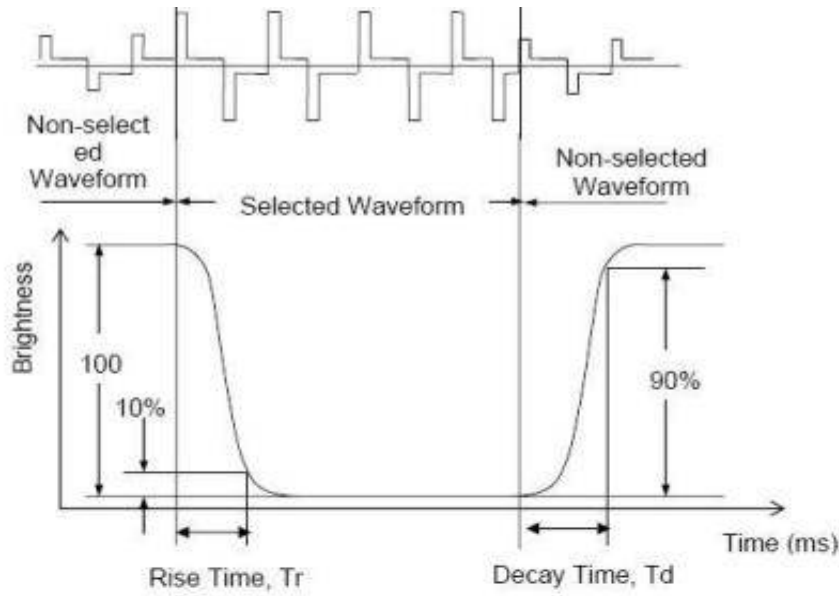
- For panel only
- Electro-Optical Characteristics Test Method



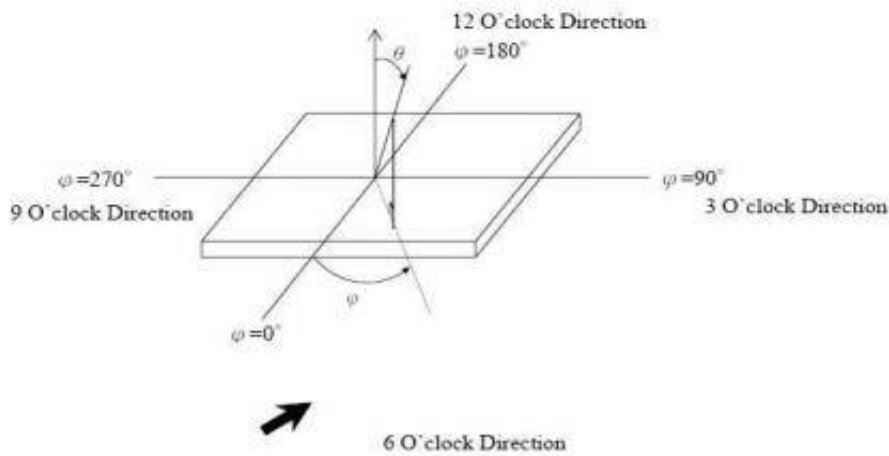
$$V_{op} = (V_{10,ON} + V_{90,OFF})/2$$



.Note2.Definition of Optical Response Time:



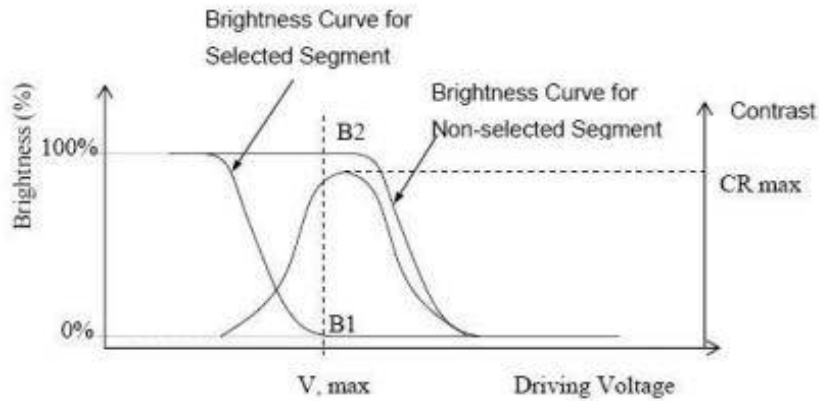
.Note3.Definition of Viewing Angle θ and ϕ :



Note4.Definition of Contrast ratio (CR):



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



10. Reliability

10.1 Mtbf

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

10.2 Test condition

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



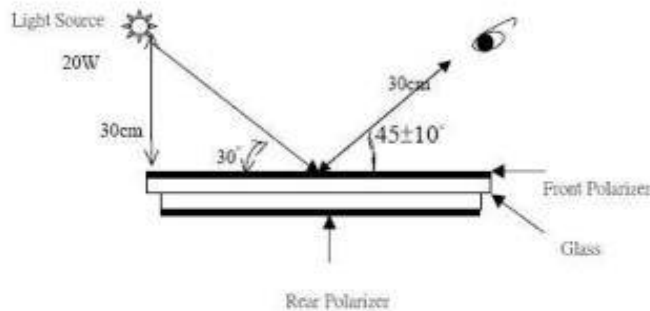
AQL of major and minor defect.

	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. Inspection item and criteria

3.1 Visual inspection criterion in immobility

3.1.1 Glass 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 ≤ 0.5 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) $C < T$ $b \approx BM/3$ of width 【Accept】 3) $c = T$ b not touch the seal glue 【Accept】 4) a disregards	a: Length, b: Width c: Thickness
6	Non-pin-side damage (minor defect)	$c < T$ 1) b exceeds $1/3Bm$ 【Reject】 $c = T$ b not touch the seal glue 【Reject】	c : Thickness b : width of

3.1.2 LCD appearance defect (View area)

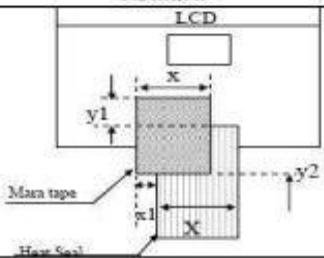
NO	Defect item	Criteria		Remark
		Specification	Allowable	
1	Fiber, glass crach, polarizer scratch/folded (minor defect)	$W \approx 0.03\text{mm}$	disregard	note1: L: Length, W: Width note2: disregard if out of AA
		$0.03\text{mm} < W \approx 0.05\text{mm};$ $L \approx 3.0\text{mm}$	2	
		$0.05\text{mm}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



3.1.3 FPC

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	Allowable	Note1: Cannot have stride ITO impurities
		$\phi \leq 0.25\text{mm}$	2	
		$\phi > 0.25$	0	

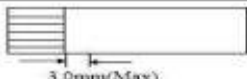
3.1.4 Black tape & Mara tape

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 bar e 【Reject】 2. left-and-right spec: 1) exceed of FPC edge or H-S edge 【Reject】 2) IC bar e 【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】	

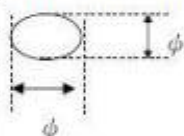
3.1.5 Silicon and Taffy glue

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】	note: if customer has special requirement, refer to the technical document
		2. Cover layer 0.3mm(Min)-3.0mm(Max) 【Reject】	



			
3	Depth of glue covering (major defect)	Depth of glue covering overtop front Polarizer 【Re ject】	Except of the special requirement

3.2Electrical criteria

NO	Defect item	Criteria	Remark	
1	No display (major defect)	No display 【Re ject】		
2	Missing line (major defect)	Missing line 【Re ject】		
3	Seg-com light and dark (major defect)	Seg-com light and dark 【Re ject】	ND filter 2% test	
4	No display in immobility (major defect)	No display in immobi lity 【Re ject】		
5	Flicker of Pattern (major defect)	Flicker of Pattern 【Re ject】		
6	Mura (major defect)	ND filter 2%test		
7	Over current (major defect)	Over current 【Re ject】		
8	Voltage out of specification (major defect)	Voltage out of specification 【Re ject】		
9	Pattem blur, error code (major defect)	Pattem blur, error code 【Re ject】		
10	Dark light, Flicker (major defect)	Dark light, Flicker 【Re ject】		
11	Black/white dots 、 Dirty dots、 eye winker (major defect)	Specification	Allowable disregard 	
		$\phi \leq 0.15\text{mm}$		2
		$0.15\text{mm} < \phi \leq 0.25\text{mm}$		1
		$0.25\text{mm} < \phi \leq 0.3\text{mm}$		0
12	Fiber、 glass crutch、 Polarizer scratch/folded (major defect)	$W \leq 0.03\text{mm}$	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 $45 \pm 20\% \text{RH}$.
- (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.

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.

12.4 Warranty

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	