



华田信科电子有限公司
HTDISPLAY ELECTRONICS CO.,LTD.

The professional LCD manufacturer

www.htdisplay.com

SPECIFICATIONS

Product Name: LCM

Model PartNumber: HT240024V

Revision: A

Date: 2018-02-26

Prepared By:	Reviewed By:	Approved By:
HT		

Customer: _____

Custoer Approved Result: OK NG

Custoer Confirmed Message: _____

Approved By: _____ Date: _____



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1. Document revision history :

DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY	APPROVED BY
A	2018-02-26	First Release.	HT	



2. General Description

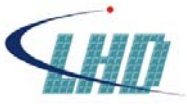
- 2.4”(diagonal), 240 x RGB x 320 dots, 262k colors, Transmissive, TFT LCD module.
- Viewing Direction: Free
- Driving IC: ILI9341V
- 3-line Serial Interface,6bit RGB Interface

3. Mechanical Specifications

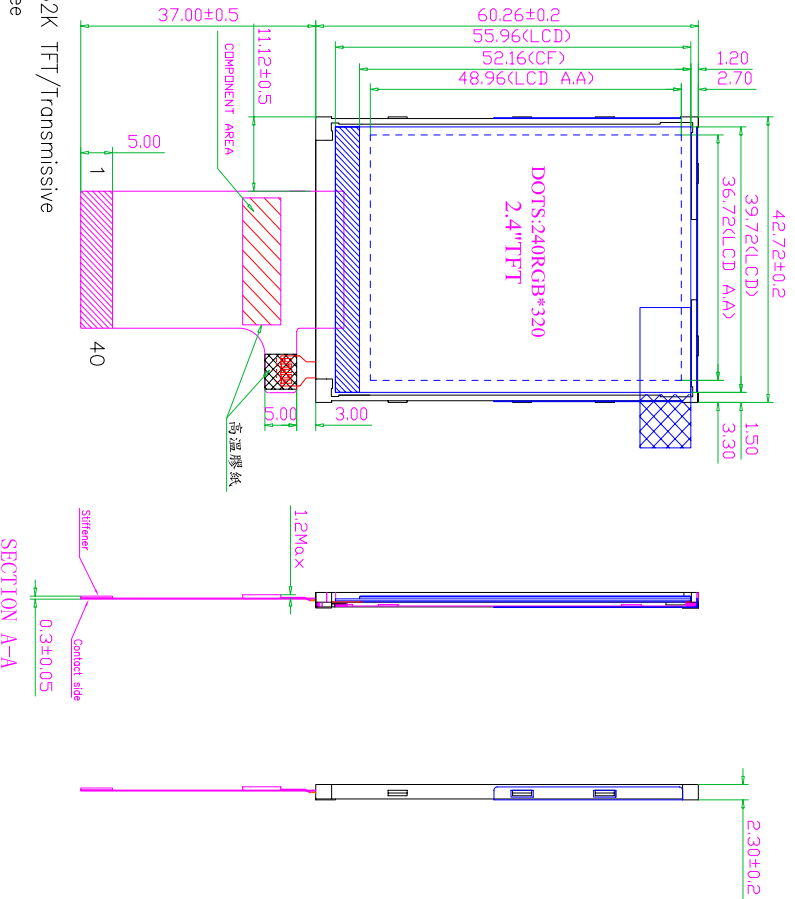
The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1

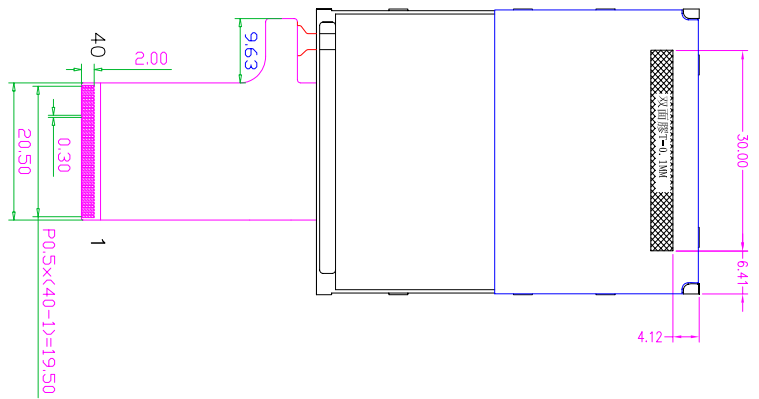
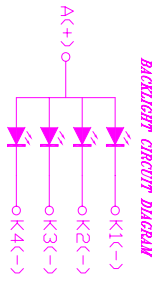
Parameter	Specifications	Unit	
Outline dimensions	42.72(W)x60.26(H)x2.30(D)	mm	
Color TFT 240xRGBx320	TP view area	mm	
	TP active area	-	
	LCD active area	36.72 (W) x 48.96(H)	mm
	Display format	240 x RGB x 320	dots
	Color configuration	RGB stripes	-
	Dot pitch	0.153(RGB)(W) x 0.153(H)	mm
Weight	TBD	grams	



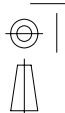
MEASURE	GRADE
L < 6	±0.05
6 < L < 20	±0.1
20 < L < 50	±0.2
50 < L < 100	±0.3
100 < L < 300	±0.4
300 < L	±0.5



- Specification:
- 1). Display mode: 262K TFT/Transmissive
 - 2). Viewing angle: Free
 - 3). Operating temp.: -20°C~+70°C
Storage temp.: -30°C~+80°C
 - 4). IC: IL9341V
 - 5). Backlight: 4 chip White LED ,in Parallel
 - 6). Backlight:VF=3.2V/IF=80mA.
 - 7). OPERATING VOLTAGE:2.8V
 - 8).LCM BACKLIGHTS : 250 cd/m²(TYP.)



PIN	Define
1~3	GND
4~5	VDD
6	VDDIO
7	DE
8~17	NC
18~19	LED-
20	NC
21~22	LED+
23	GND
24	VDD
25	VSYNC
26	HSYNC
27	DCLK
28	DB0
29	DB1
30	DB2
31	DB3
32	DB4
33	DB5
34~35	NC
36	SDA
37	SCL
38	CS
39	NC(LCM_ID)
40	RESET



REV.	1.0	AUTH	NEW DRAWING	DESCRIPTION	DATE	DRAWN	LYF	APPROVE:	DWG. NO.	HT240024V	TITLE:	LCM OUTLINE DIMENSION	DOC. NO.	PART NO.	REV.	1.0	SHEET	1 OF 1	SCALE	1:1	UNITS:MM
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HTDISPLAY CO.,LTD.



4. Interface signals

Table 2: Pin assignment

Pin No	Symbol	Description
1-3	GND	Ground
4-5	VDD	Power supply for the analog circuit. 2.8V
6	VDDIO	Power supply for the logic circuit. 1.8V/2.8V
7	DE	Data enable signal for RGB interface operation.
8-17	NC	Dummy
18-19	LED-	Power supply for LED-K
20	NC	Dummy
21~22	LED+	Power supply for LED-A
23	GND	Ground
24	VDD	Power supply for the analog circuit. 2.8V
25	VSYNC	Frame synchronizing signal for RGB interface operation.
26	HSYNC	Line synchronizing signal for RGB interface operation.
27	DCLK	Dot clock signal for RGB interface operation.
28	DB0	Data bus
29	DB1	Data bus
30	DB2	Data bus
31	DB3	Data bus
32	DB4	Data bus
33	DB5	Data bus
34~35	NC	Dummy
36	SDA	Serial input signal. The data is applied on the rising edge of the SCL signal.
37	SCL	This pin is used as the serial interface clock
38	CS	Chip select input pin ("Low" enable).
39	NC	Dummy
40	RESET	This signal will reset the device, Signal is active low.



5. Absolute Maximum Ratings

5.1 Electrical Maximum Ratings – for IC Only

Table 3: Electrical Maximum Ratings – for IC

Parameter	Symbol	Min.	Max.	Unit	Note
Power supply voltage (VCC)	VCC	2.6	+3.3	V	1
Power supply voltage (IOVCC)	IOVCC	1.65	+3.3	V	1

Note:

1. IOVCC, VCC, GND must be maintained.
2. The modules may be destroyed if they are used beyond the absolute maximum ratings.

5.2 Environmental Condition

Table 4

Item	Operating temperature (Topr)		Storage temperature (Tstg) (Note 1)		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	-20°C	+70°C	-30°C	+80°C	Dry
Humidity (Note 1)	80% max. RH for Ta ≤ 40°C < 50% RH for 40°C < Ta ≤ Maximum operating temperature				No condensation

Note 1: Product cannot sustain at extreme storage conditions for long time.

6. Electrical Specifications

Typical Electrical Characteristics

At Ta = 25 °C, VCC= 2.6V to 3.3V, IOVCC= 1.65V to 3.3V, GND=0V.

Table 5

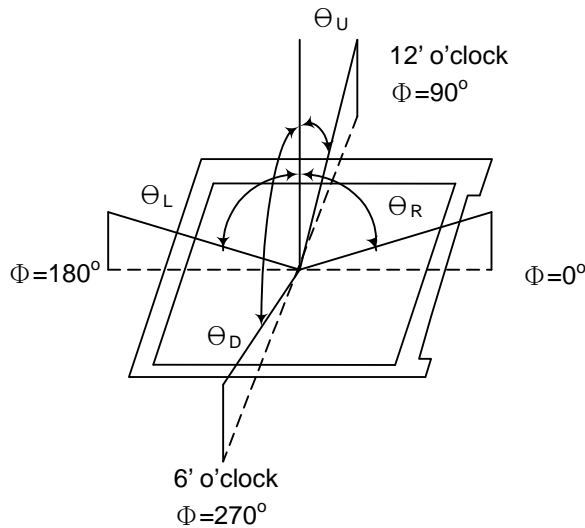
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (analog)	VCC-GND		2.6	2.8	3.3	V
Supply voltage (logic)	IOVCC-GND		1.65	1.8/2.8	3.3	V
Supply current (Logic & LCD)	ICC	VCC=2.8V	-	-	10	mA
Supply voltage of white LED backlight	VLED =V(BL+)-V(BL-)	Forward current =80 mA Number of LED dies = 4	-	3.2	-	V
Luminance (on the module surface)			-	250	-	cd/m ²

7. Optical Characteristics

Table 6: Optical specifications

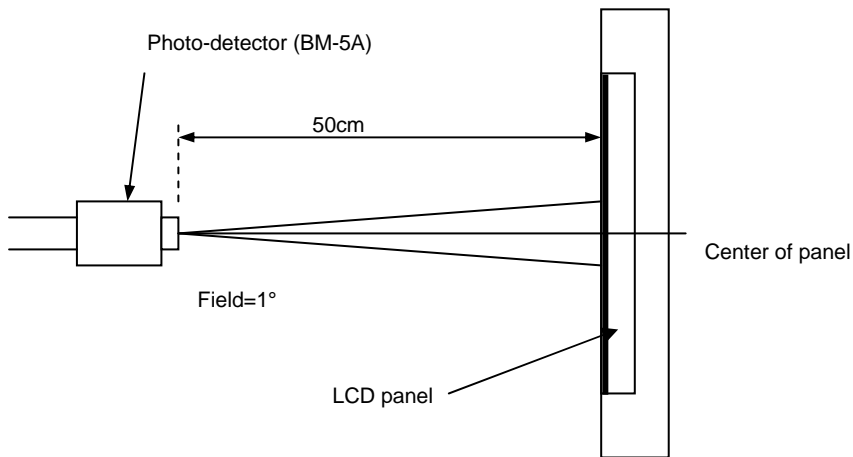
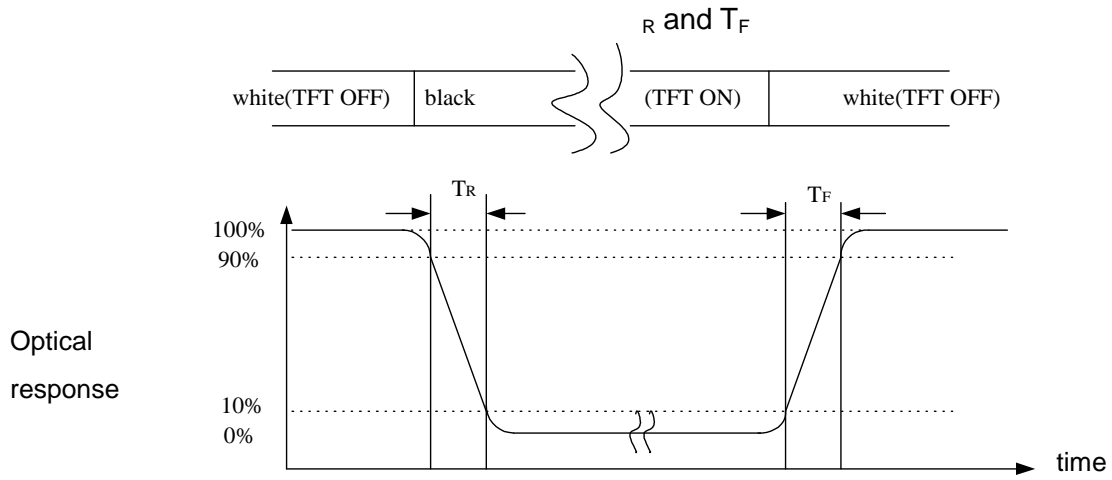
Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Transmittance (with Polarizer)	T (%)	Θ=0 Normal viewing angle	—	4.65	—	%	Measuring with Polarizer , Reference Only	
Transmittance (without Polarizer)	T (%)		—	14.6	—	%		
Contrast Ratio	CR		640	800	—	—	(1)(2)	
Response Time	Rising		T _R	—	16	21	msec	(1)(3)
	Falling		T _F	—	19	24		
Color Gamut	(%)		—	70	—	%	C-light	
Color Chromaticity (CIE1931)	White	W _x	0.290	0.310	0.330	—	(1)(4) CF glass	
		W _y	0.316	0.336	0.356			
	Red	R _x	0.627	0.647	0.667	—		
		R _y	0.297	0.317	0.337			
	Green	G _x	0.255	0.275	0.295	—		
		G _y	0.562	0.582	0.602			
	Blue	B _x	0.120	0.140	0.160	—		
		B _y	0.068	0.088	0.108			
Viewing Angle	Hor.	Θ _L	—	80	—	—	(1)(4) Measuring with Polarizer , Reference Only	
		Θ _R	—	80	—			
	Ver.	Θ _U	—	80	—			
		Θ _D	—	80	—			
Optima View Direction	Free						(5)	

Note (1) Definition of Viewing Angle:

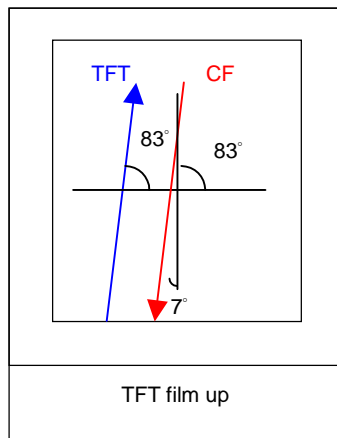


Note (2) Definition of Contrast Ratio (CR):
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

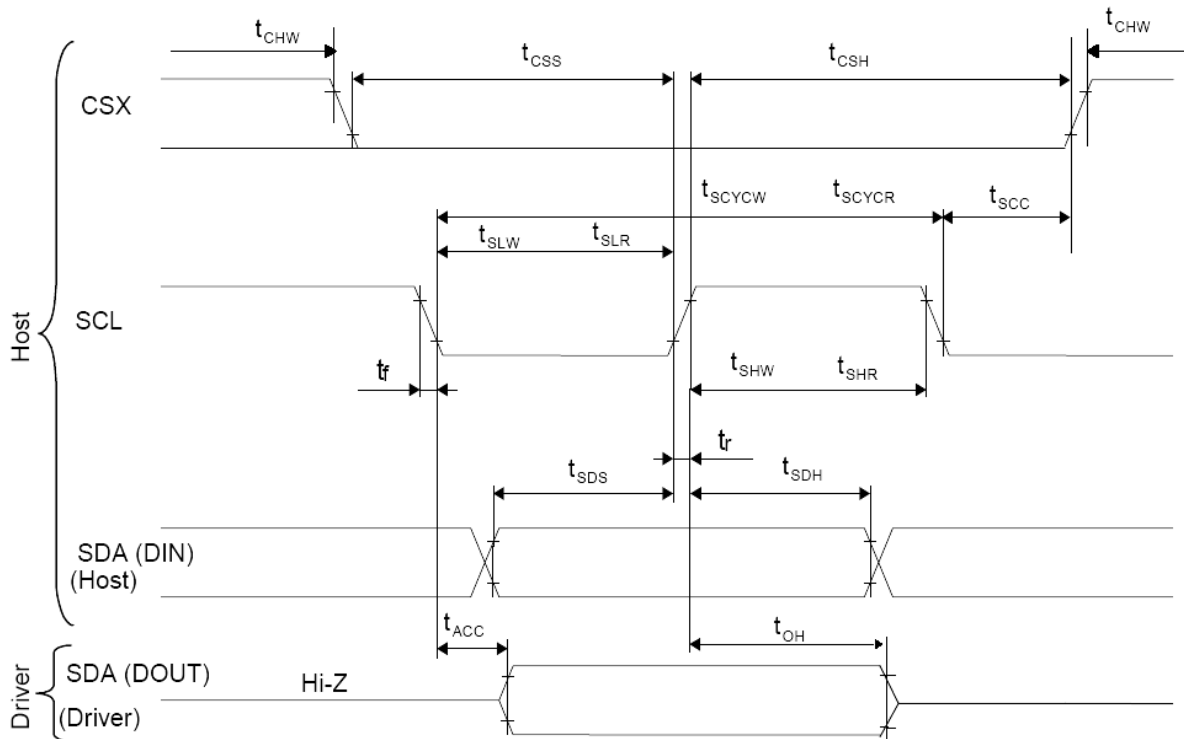


Note (5) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.)



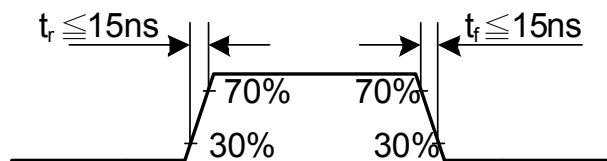
8. Timing Characteristics

8.1.1 Display Serial Interface Timing Characteristics (3-line SPI system)

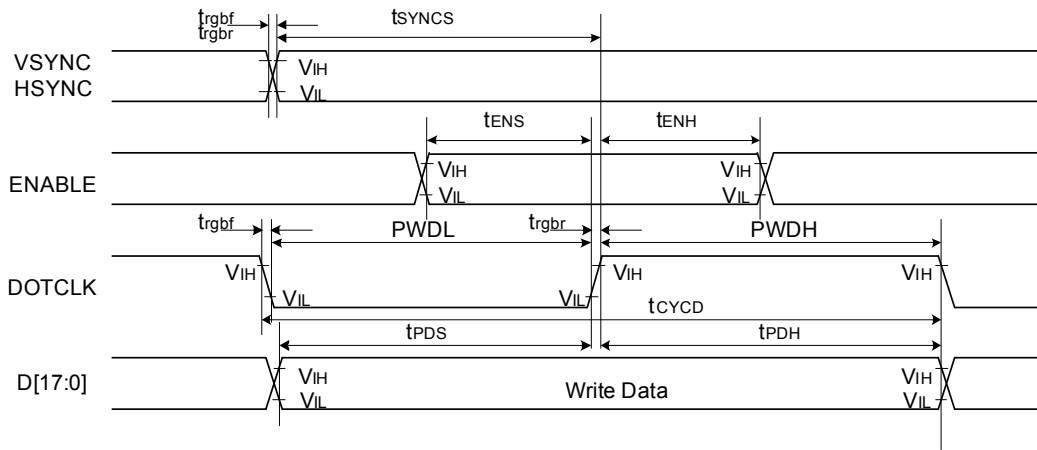


Signal	Symbol	Parameter	min	max	Unit	Description
SCL	tscycw	Serial Clock Cycle (Write)	100	-	ns	
	tshw	SCL "H" Pulse Width (Write)	40	-	ns	
	tslw	SCL "L" Pulse Width (Write)	40	-	ns	
	tscycr	Serial Clock Cycle (Read)	150	-	ns	
	tshr	SCL "H" Pulse Width (Read)	60	-	ns	
	tslr	SCL "L" Pulse Width (Read)	60	-	ns	
SDA / SDI (Input)	tsds	Data setup time (Write)	30	-	ns	
	tsdh	Data hold time (Write)	30	-	ns	
SDA / SDO (Output)	tacc	Access time (Read)	10	-	ns	
	toh	Output disable time (Read)	10	50	ns	
CSX	tsc	SCL-CSX	20	-	ns	
	tch	CSX "H" Pulse Width	40	-	ns	
	tcss	CSX-SCL Time	60	-	ns	
	tch		65	-	ns	

Note: $T_a = 25\text{ }^\circ\text{C}$, $V_{DDI}=1.65\text{V to }3.3\text{V}$, $V_{CI}=2.5\text{V to }3.3\text{V}$, $AGND=VSS=0\text{V}$

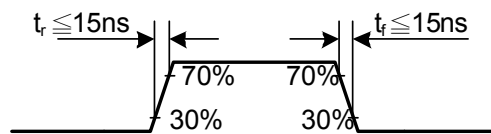


8.1.2 Parallel 18/16/6-bit RGB Interface Timing Characteristics



Signal	Symbol	Parameter	min	max	Unit	Description
VSYNC / HSYNC	t _{SYNCS}	VSYNC/HSYNC setup time	15	-	ns	18/16-bit bus RGB interface mode
	t _{SYNCH}	VSYNC/HSYNC hold time	15	-	ns	
DE	t _{ENS}	DE setup time	15	-	ns	
	t _{ENH}	DE hold time	15	-	ns	
D[17:0]	t _{POS}	Data setup time	15	-	ns	
	t _{PDH}	Data hold time	15	-	ns	
DOTCLK	PWDH	DOTCLK high-level period	15	-	ns	
	PWDL	DOTCLK low-level period	15	-	ns	
	t _{CYCD}	DOTCLK cycle time	100	-	ns	
	t _{RGBr} , t _{RGBf}	DOTCLK,HSYNC,VSYNC rise/fall time	-	15	ns	
VSYNC / HSYNC	t _{SYNCS}	VSYNC/HSYNC setup time	15	-	ns	6-bit bus RGB interface mode
	t _{SYNCH}	VSYNC/HSYNC hold time	15	-	ns	
DE	t _{ENS}	DE setup time	15	-	ns	
	t _{ENH}	DE hold time	15	-	ns	
D[17:0]	t _{POS}	Data setup time	15	-	ns	
	t _{PDH}	Data hold time	15	-	ns	
DOTCLK	PWDH	DOTCLK high-level pulse period	15	-	ns	
	PWDL	DOTCLK low-level pulse period	15	-	ns	
	t _{CYCD}	DOTCLK cycle time	50	-	ns	
	t _{RGBr} , t _{RGBf}	DOTCLK,HSYNC,VSYNC rise/fall time	-	15	ns	

Note: Ta = -30 to 70 °C, VDDI=1.65V to 3.3V, VCI=2.5V to 3.3V, AGND=VSS=0V



8.2 Reset Operation of IC

Table 8: Reset Timing Characteristics (VCC = 2.8V)

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

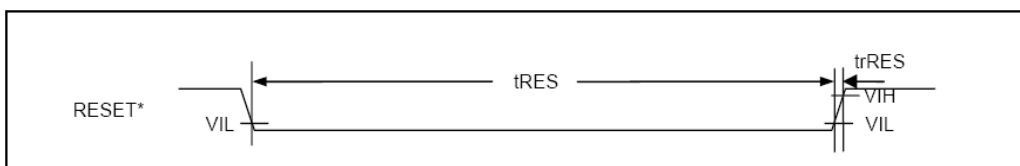


Figure 7: Reset Timing



9. Reliability Test Item

Test Item	Sample Type	Test Condition	Test result determinant gist
High temperature storage	Normal temperature	70±3℃;96H	the inspection of appearance and function character.
	Wide temperature	80±3℃;96H	
Low temperature storage	Normal temperature	-20±3℃;120H	
	Wide temperature	-30±3℃;120H	
High temperature /humidity storage	Normal temperature	50℃±3℃,90%±3%RH;96H	
	Wide temperature	60℃±3℃,90%±3%RH;96H	
High temperature operation	Normal temperature	60±3℃;96H	no objection of the function character; no fatal objection of the appearance.
	Wide temperature	70±3℃;96H	
Low temperature operation	Normal temperature	0±3℃;96H	
	Wide temperature	-20±3℃;96H	
High temperature /humidity operation	Normal temperature	40℃±3℃,90%±3%RH;96H	
	Wide temperature	50℃±3℃,90%±3%RH;96H	
Temperature Shock	Normal temperature	-20±3℃,30min→70±3℃,30min;10cycle	inspect the objections appearance、function & the whole structure
	Wide temperature	-30±3℃,30min 80±3,30min;10cycle	The inspection of appearance、function & the whole structure

10. Inspection Standards

1. AQL(Acceptable Quality Level)
AQL of major and minor defect

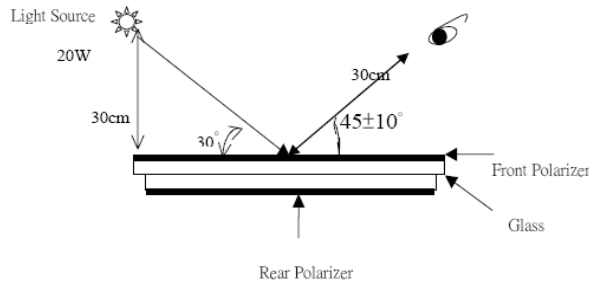
	MAJOR DEFECT	MINOR DEFECT	MAJOR+MINOR
APPEARANCE	0.40%	1.0%	1.0%
ELECTRIC-OPTICAL	0.15%	0.15%	0.15%

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 30cm with normal eye,with an angle of 45 degree to check the products without uncovering the film!

(As shown below)

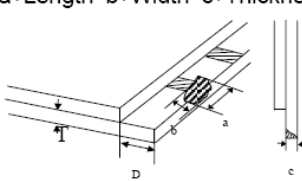
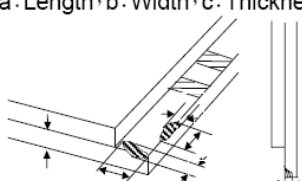


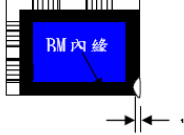
3. Inspection item and criteria

3.1 Visual inspection criterion in immobility

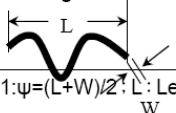
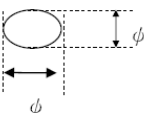
3.1.1 Glass defect

No	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	

No	Defect item	Criteria	Remark
2	Cracks (Major defect)	1.Linear cracks on 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) $c < T$ $b \leq BM$ 1/3 of width 【Accept】 3) $c = T$ b not touch the seal glue 【Accept】 4) a disregards	a : Length · b : Width · c : Thickness 

No	Defect item	Criteria	Remark
6	Non-pin-side damage (minor defect)	c<T 1) b exceeds 1/3 BM 【 Reject】	c : Thickness b: width of damage 
		c=T b not touch the seal glue 【 Reject】	

3.1.2 LCD appearance defect (View area)

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

3.1.3 .FPC

No	Defect item	Criteria	Remark	
1	Copper screen peel (Major defect)	Copper screen peel 【 Reject】		
2	No release tape or peel (Major defect)	No release tape or peel 【 Reject】		
3	Dirty dot and impurity of FPC for customer using side (minor defect)	Specification	note1: Cannot have stride ITO impurities	
		$\psi \leq 0.25\text{mm}$		2
		$\psi > 0.25$		0

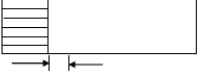
3.1.4 Black tape & Mara tape

1	FPC or H/S black tape shift (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 【 Reject】	
4	Mara tape defect (minor defect)	Peel before pulling the protecting film. 【 Reject】	



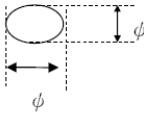
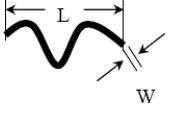
3.1.5 Silicon and Tuffy glue

No	Defect item	Criteria	Remark
1	Quantity of silicon (minor defect)	Uncover the ITO and circuit area. 【Reject】	note: compared by engineering drawing.

No	Defect item	Criteria	Remark
2	Tuffy glue (minor defect)	1. Uncover the reveal copper area 【Reject】 2. Cover layer 0.3mm(Min) ~ 3.0mm(Max) 【accept】	note:if customer has special requirement , refer to the technical document. 
3	Depth of glue covering (minor defect)	Depth of glue covering overtop front Polarizer 【Reject】	Except of the special requirement .

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】	

No	Defect item	Criteria	Allowable	Remark
11	Black/White dots 、 Dirty dots 、eyewinker (Major defect)	Specification	Allowable	Note1: disregard if out of AA 
		$\psi \leq 0.15\text{mm}$	disregard	
		$0.15\text{mm} < \psi \leq 0.25\text{mm}$	2	
		$0.25\text{mm} < \psi \leq 0.3\text{mm}$	1	
		$0.3\text{mm} < \psi$	0	
12	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	



10. Suggestions for using LCD modules

10.1 Handling of LCM

1. The LCD screen is made of glass. Don't give excessive external shock, or drop from a high place.
2. If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.
3. Don't apply excessive force on the surface of the LCM.
4. If the surface is contaminated ,clean it with soft cloth. If the LCM is severely contaminated , use Isopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer . The following solvents is especially prohibited: water , ketone Aromatic solvents etc.
5. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
6. Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
7. Don't disassemble the LCM.
8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - Be sure to ground the body when handling the LCD modules.
 - Tools required for assembling, such as soldering irons, must be properly grounded.
 - To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
 - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
9. Do not alter, modify or change the the shape of the tab on the metal frame.
10. Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
11. Do not damage or modify the pattern writing on the printed circuit board.
12. Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector
13. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
14. Do not drop, bend or twist LCM.

10.2 Storage

1. Store in an ambient temperature of 5 to 45 °C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.
2. Storage in a clean environment, free from dust, active gas, and solvent.
3. Store in antistatic container.



11. Packing

TBD

- END -