

PRODUCT SPECIFICATION **FOR LCD MODULE**

Revision: 1.0

Model No: LS045I14-R-V1

Module Type: COG+FPC+B/L

APPROVED SIGNATURE

- ☒ Approved Product Specification only
- ☐ Approved Product Specification and Samples

For Customer's Acceptance

Approved by	Comment

Contents

目录

1. General Description	3
2. Physical Features	3
3. Mechanical Specification	3
4. Outline Dimension	4
5. Absolute Maximum Ratings	5
6. Electrical Characteristics	5
7. Module Function Description	6
8. Electro-Optical Characteristics	11
9. Inspection Standards	13
10. Records Of Version	19

1. General Description

LS045I14-R-V1 is a transmissive type a-Si TFT-LCD (amorphous silicon thin film transistor liquid crystal display) module, which is composed of a TFT-LCD panel, a driver circuit and a backlight unit. The panel size is 4.45 inch and the resolution is 480(RGB)*854, the panel can display up to 16.7 M colors.

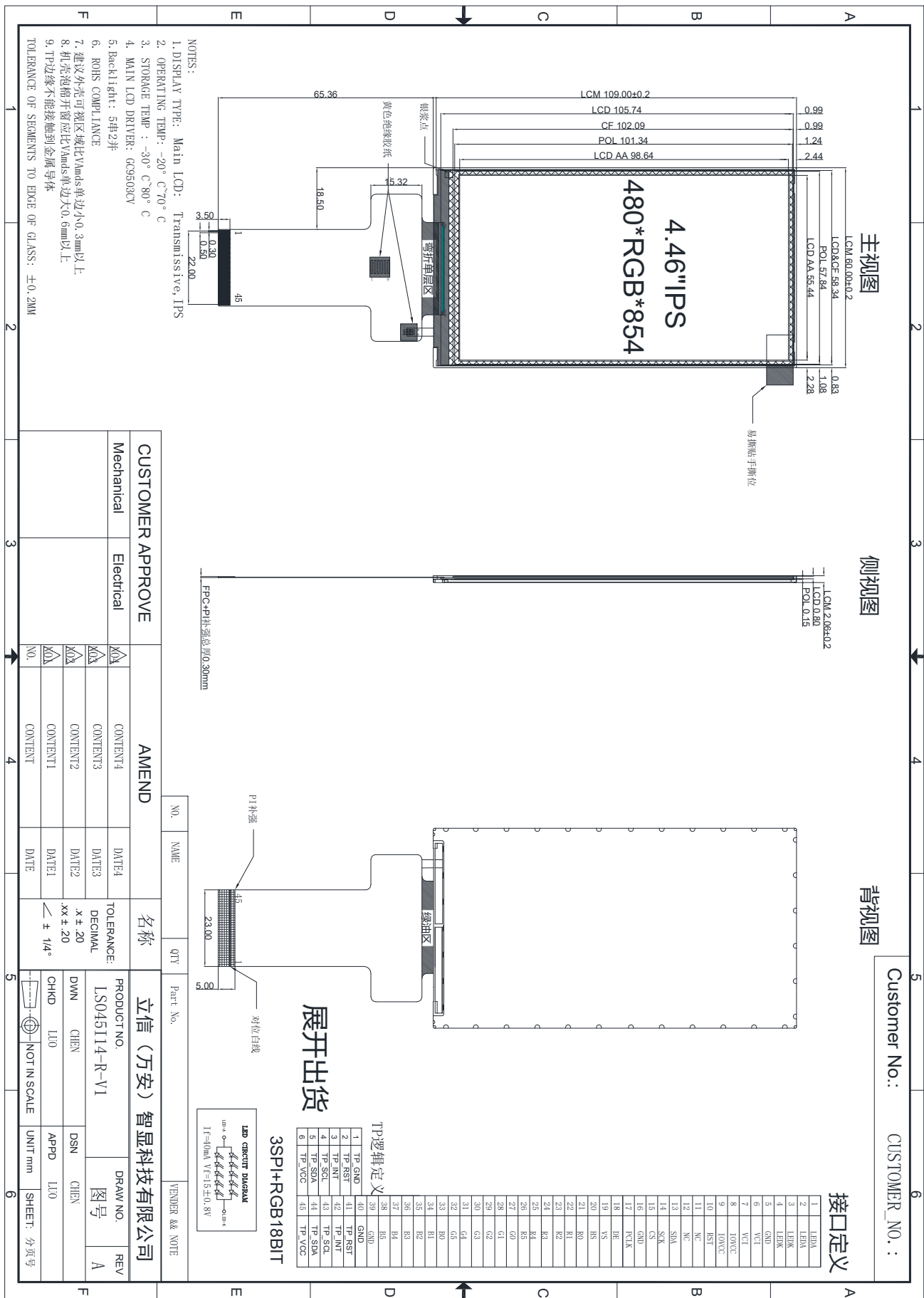
2. Physical Features

Display Mode	TFT-LCD Module
	Active matrix TFT, Transmissive type
Display Format	Graphic 480(RGB)×854 Dot-matrix
Input Data	18bit RGB
Viewing Direction (Grayscale Inversion)	Free (IPS)
Drive	GC9503CV

3. Mechanical Specification

Item	Specification	Unit
Module size (H×V×D)	60 ×109 ×2.06	mm
Number of dots	480(RGB) × 854	pixel
Active area (H×V)	55.44×98.637	mm

4. Outline Dimension



5. Absolute Maximum Ratings

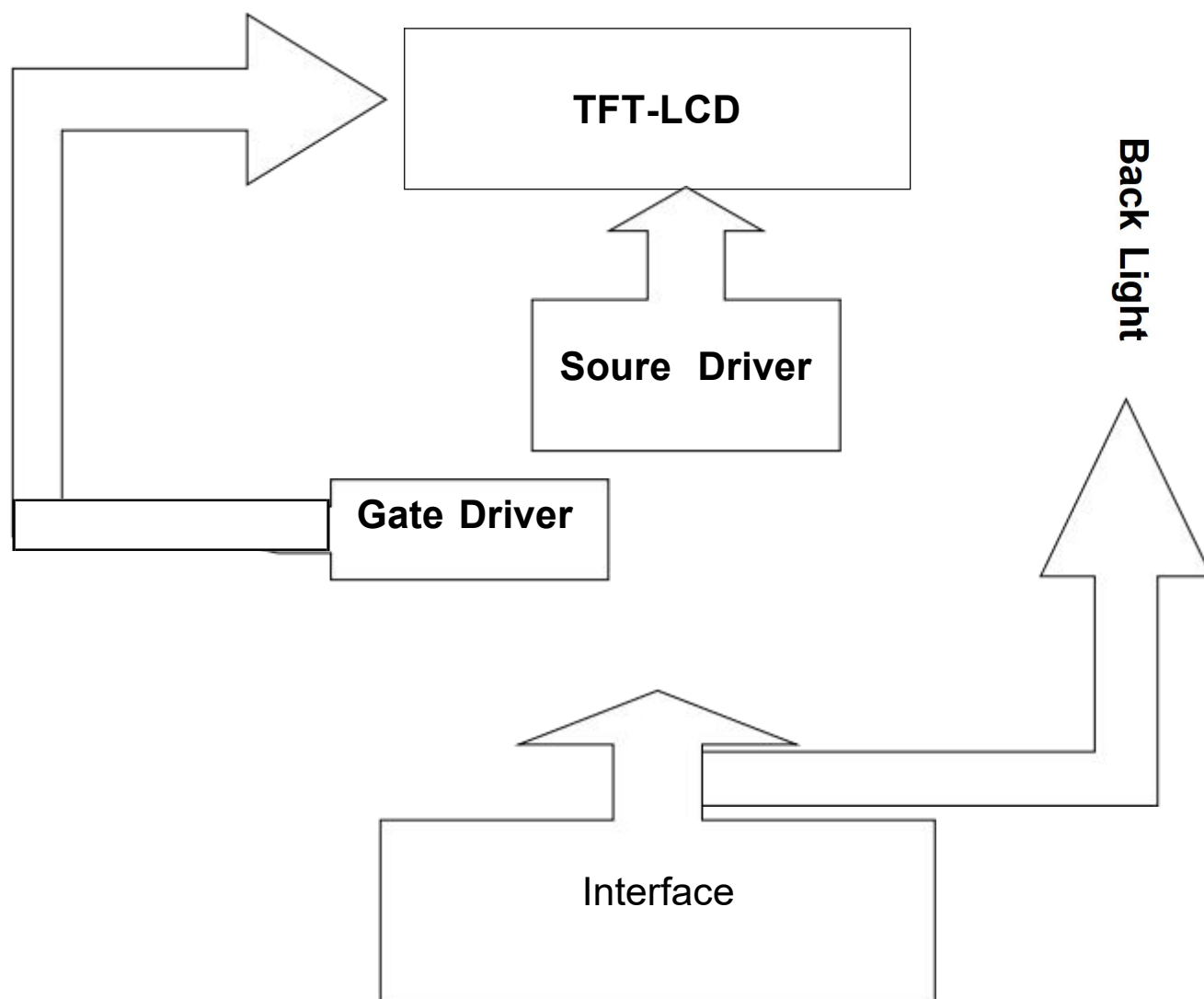
Item	Symbol	Min	Max	Unit	Remark
Supply voltage	VCI	-0.3	4.6	V	Note1 Note2
Supply voltage	IOVCC	-0.3	4.6	V	
Operating temperature	TOPR	-20	70	°C	
Storage temperature	TSTR	-30	80	°C	

6. Electrical Characteristics

Item		Symbol	Rating			Unit	Remark
			Min	Typ	Max		
Supply voltage		VCI	2.5	2.8	3.3	V	Note1
Supply voltage		IOVCC	1.65	1.8	3.3	V	
Input Voltage	L level	VIL	VSS	---	0.3*IOVCC	V	
	H level	VIH	0.7*IOVCC	---	IOVCC	V	
LCD Drive Power current		ILCD		TBD		mA	

7. Module Function Description

7- 1. Block Diagram Of LCM



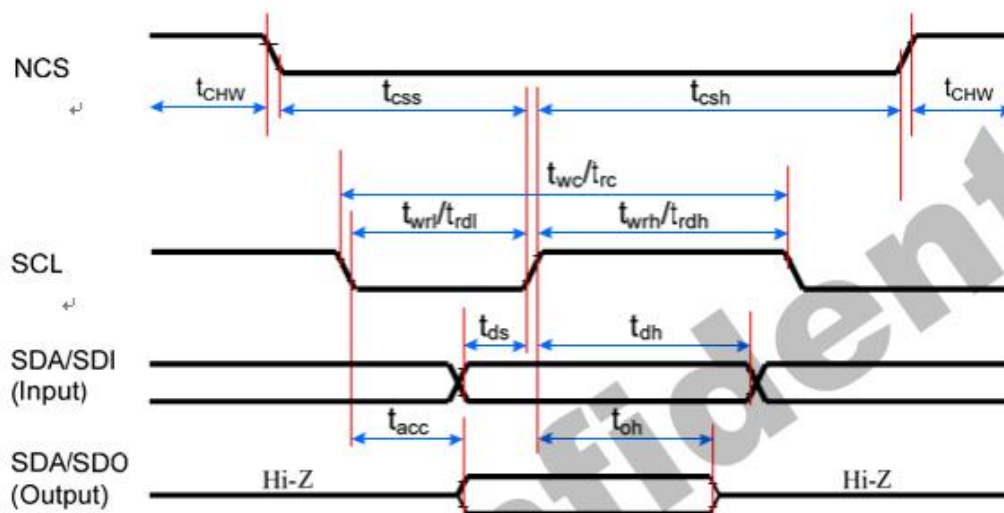
7-2. Pin Description

PIN NO.	Symbol	I/O	Description
1	LED A	P	Power for LED backlight anode
2	LED A	P	Power for LED backlight anode
3	LED K	P	Power for LED backlight cathode
4	LED K	P	Power for LED backlight cathode
5	GND	P	Ground
6	VCI	P	power supply
7	VCI	P	power supply
8	IOVCC	P	power supply
9	IOVCC	P	power supply
10	RST	I	The external reset input.
11	NC		
12	NC		
13	SDA	I	Serial data input pin used for the SPI Interface. SDI : Serial data input pin
14	SCK	I	The SPI Interface (SCL): Serves as a write signal and writes data at the rising edge. Serial interface (SCL): Serial clock input.
15	CS	I	chip select signal.
16	GND	P	Ground
17	PCLK	I	Dot clock signal for DPI (RGB) interface operation.
18	DE	I	Data enable signal for DPI (RGB) interface operation
19	VS	I	Frame synchronizing signal for DPI (RGB) interface operation
20	HS	I	Line synchronizing signal for DPI (RGB) interface operation.
21	R0	I	data bus
22	R1	I	data bus
23	R2	I	data bus
24	R3	I	data bus
25	R4	I	data bus
26	R5	I	data bus
27	G0	I	data bus
28	G1	I	data bus
29	G2	I	data bus
30	G3	I	data bus
31	G4	I	data bus
32	G5	I	data bus
33	B0	I	data bus
34	B1	I	data bus

35	B2	I	data bus
36	B3	I	data bus
37	B4	I	data bus
38	B5	I	data bus
39	GND	P	Ground
40	GND	P	Ground
41	TP_RST		NC
42	TP_INT		NC
43	TP_SCL		NC
44	TP_SDA		NC
45	TP_VCC		NC

7-3 Timing Characteristics

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

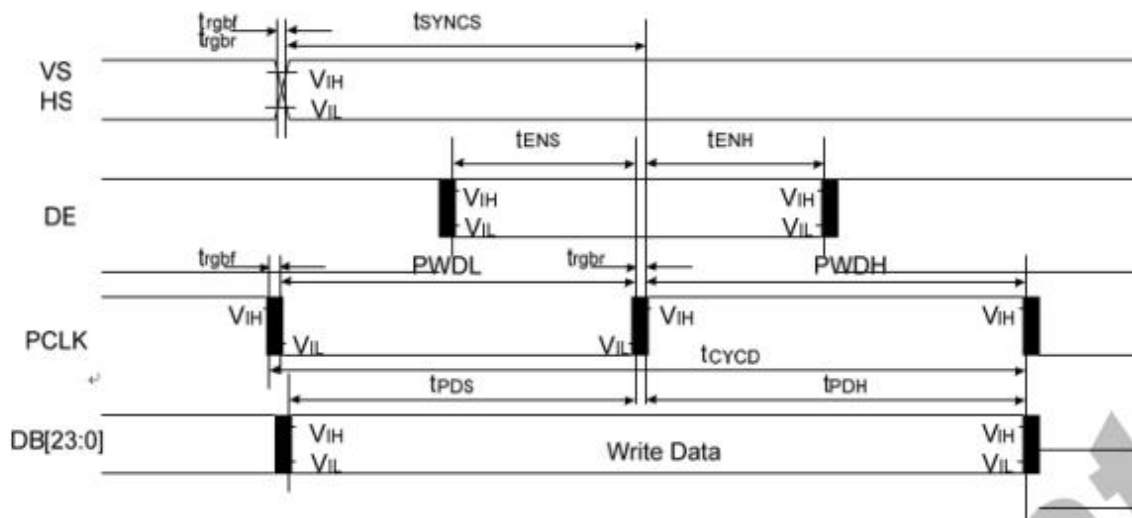


Signal	Symbol	Parameter	min	max	Unit	Description
CSX	t _{CSS}	Chip select time (Write)	15	-	ns	
	t _{CSh}	Chip select hold time (Read)	15	-	ns	
	t _{CHW}	CS "H" pulse width	40	-	ns	
SCL	t _{WC}	Serial clock cycle (Write)	30	-	ns	
	t _{WRH}	SCL "H" pulse width (Write)	10	-	ns	
	t _{WRL}	SCL "L" pulse width (Write)	10	-	ns	
	t _{RC}	Serial clock cycle (Read)	150	-	ns	
	t _{RDH}	SCL "H" pulse width (Read)	60	-	ns	
	t _{RDL}	SCL "L" pulse width (Read)	60	-	ns	
SDA/SDO (Output)	t _{ACC}	Access time (Read)	10	100	ns	For maximum CL=30pF
	t _{OH}	Output disable time (Read)	15	100	ns	For minimum CL=8pF
SDA/SDI (Input)	t _{DS}	Data setup time (Write)	10	-	ns	
	t _{DH}	Data hold time (Write)	10	-	ns	

Note:

1. Ta = -30 to 70 °C, VDDI=1.65V to 3.6V, VDD=2.5V to 3.6V, T=10+/-0.5ns.
2. Does not include signal rise and fall times.

8.8.2 Parallel 24/18/16-bit RGB Interface Timing Characteristics



Signal	Symbol	Parameter	min	max	Unit	Description
	tSYNCS	VS/HS setup time	5	-	ns	24/18/16-bit bus RGB interface mode
	tSYNCH	VS/HS hold time	5	-	ns	
DE	tENS	DE setup time	5	-	ns	
	tENH	DE hold time	5	-	ns	
DB[23:0]	tPOS	Data setup time	5	-	ns	
	tPDH	Data hold time	5	-	ns	
PCLK	PWDH	PCLK high-level period	13	-	ns	
	PWDL	PCLK low-level period	13	-	ns	
	tCYCD	PCLK cycle time	28	-	ns	
	trgbr , trgbf	PCLK,HS,VS rise/fall time	-	15	ns	

Note: Ta = -30 to 70 °C, VDDI=1.65V to 3.6V, VDD=2.5V to 3.6V, DGND=0V

8. Electro-Optical Characteristics

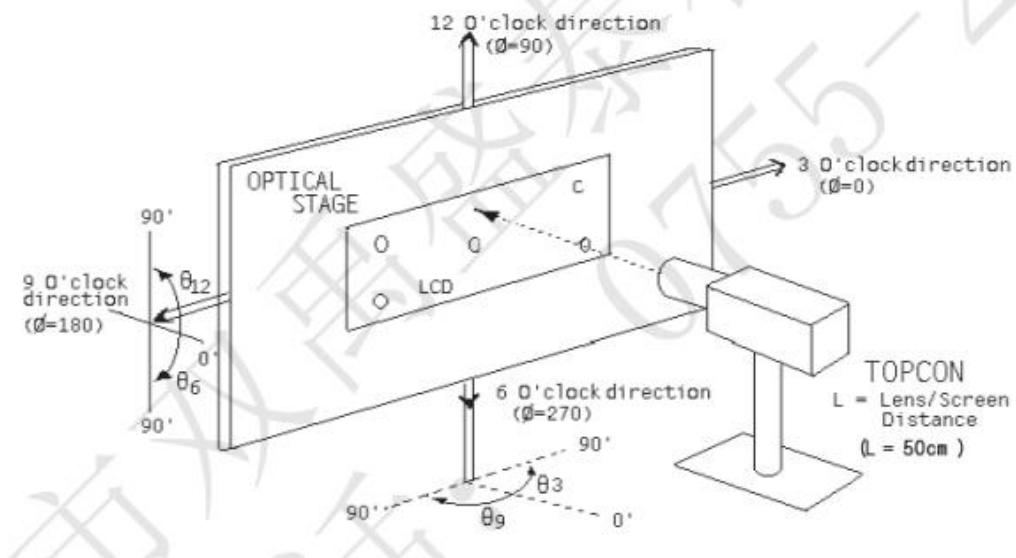
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time		Tr +Tf	$\theta_x = \theta_y = 0$	---	20	35	ms	Note 1
Contrast Ratio		CR		550	700	---	---	Note 2
Transmittance		T%		3.4	4.0	---	%	
Color Chromaticity (CIE1931)	White	W x	$\theta_x = \theta_y = 0$	0.269	0.299	0.329	---	
		W y		0.297	0.327	0.357	---	
Viewing angle	θ_T		CR > 10	---	80	---	Deg.	Note 3
	θ_B			---	80	---		
	θ_L			---	80	---		
	θ_R			---	80	---		
Luminance ($I_F = 40mA$)		L			350	---	cd/m2	Note4

Note :

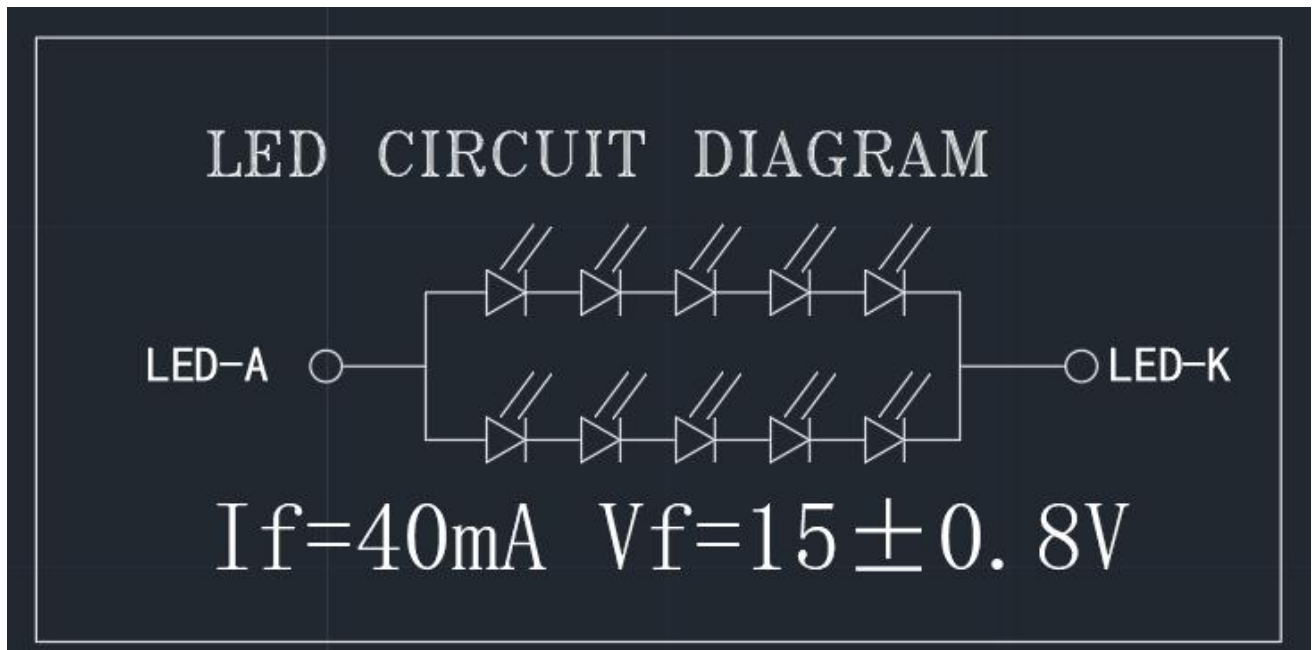
1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).
2. Contrast measurements shall be made at viewing angle of $\Theta = 0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1)

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

Figure 2. Measurement Set Up



Note(4) Backlight circuit



9. Inspection Standards

1. AQL(Acceptable Quality Level)

AQL of major and minor defect

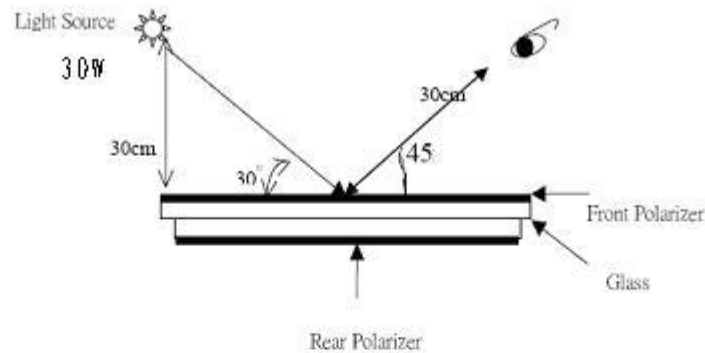
According to GB/T 2828-2003 ; , normal inspection, Class II

MAJOR DEFECT	MINOR DEFECT
0.65	1.5

2. Basic conditions for inspection

The LCM face to us, in normal environment, 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)

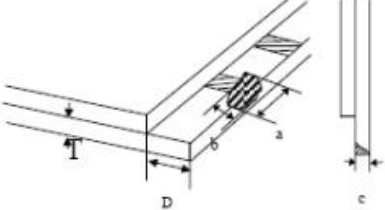
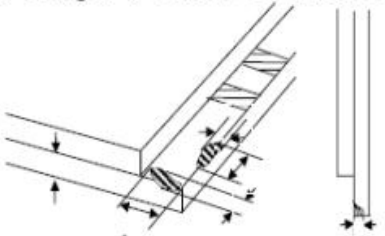


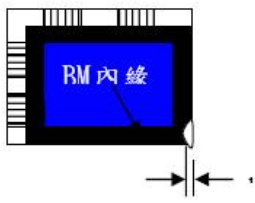
3. Inspection item and criteria

3.1 Visual inspection criterion in immobility

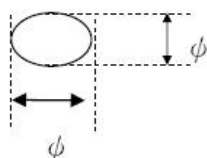
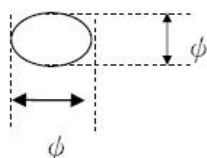
3.1.1 Glass defect

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 $\leq 0.5\text{mm}$ 【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  The diagram shows a 3D perspective of a rectangular panel with a grid of pins. A rectangular area on the side of the panel is shaded to represent damage. Dimensions are labeled: 'a' for the length of the damaged area along the panel, 'b' for the width of the damaged area, and 'c' for the thickness of the panel. A cross-section view on the right shows the panel's profile with dimension 'c' indicating thickness.
5	Pin-side , non-conductive area damaged (minor defect)	1) Damage area don't touch the ITO (Inclueing 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  The diagram shows a 3D perspective of a rectangular panel with a grid of pins. A rectangular area on the side of the panel is shaded to represent damage. Dimensions are labeled: 'a' for the length of the damaged area along the panel, 'b' for the width of the damaged area, and 'c' for the thickness of the panel. A cross-section view on the right shows the panel's profile with dimension 'c' indicating thickness. The diagram also shows the relationship between the damaged area and the ITO layer.

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

3.1.2 LCD appearance defect (View area)

No	Defect item	Criteria		Remark
1	Fiber 、 glass cratch 、 polarizer scratch/folded (minor defect)	Specification	Allowable	note1: L : Length , W : Width note2: disregard if out of AA 
		$0.05\text{mm} < W \leq 0.1\text{mm};$ $L \leq 3.0\text{mm}$	1	
		$W > 0.1\text{mm}; L > 3.0\text{mm}$	0	
2	Polarizer bubble 、 concave and convex (minor defect)	$\psi \leq 0.2\text{mm}$	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

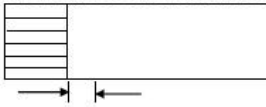
No	Defect item	Criteria		Remark
1	Copper screen peel (Major defect)	Copper screen peel 【 Reject】		
2	No release tape or peel (Major defect)	No release tape or peel 【 Reject】		
3	Dirty dot and impurity of FPC for customer using side (minor defect)	Specification	Allowable	note1: Cannot have stride ITO 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】	

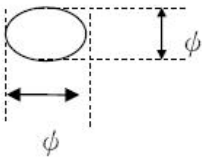
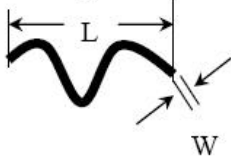
3.1.5 Silicon and Tuffy glue

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	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.Records Of Version

Version	Revise Date	Page	Content
00	2025-12-15	all	New released