

PRODUCT SPECIFICATION **FOR LCD MODULE**

Revision: 1.0

Model No: LSC043I08-R-V1

Module Type: COG+FPC+B/L+CTP

APPROVED SIGNATURE

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

<u>Prepared By</u>	<u>Checked By</u>	<u>Approved By</u>

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1. General Description

LSC043I08-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 4.3 inch and the resolution is 480(RGB)*800, 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)×800 Dot-matrix
Input Data	24BIT RGB
Viewing Direction (Grayscale Inversion)	Free (IPS)
Drive	ST7701SN

3. Mechanical Specification

Item	Specification	Unit
Module size (H×V×D)	63.96 ×105.73 ×3.42	mm
Number of dots	480(RGB) × 800	pixel
Active area (H×V)	56.16×93.6	mm





5. Absolute Maximum Ratings

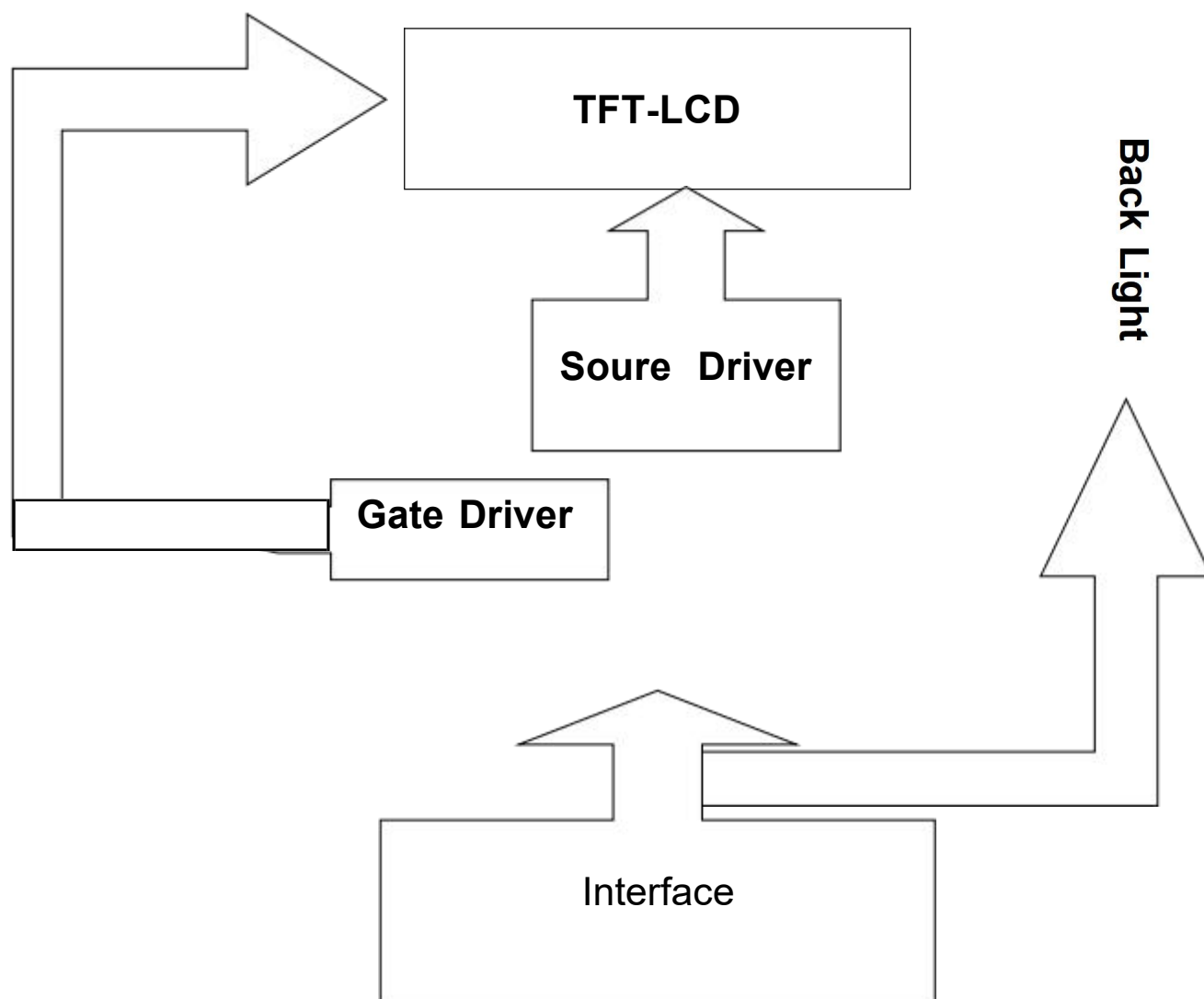
Item	Symbol	Min	Max	Unit	Remark
Supply voltage	VCC	-0.3	3.6	V	Note1 Note2
Supply voltage	IOVCC	-0.3	3.6	V	
Operating temperature	TOPR	-20	70	°C	
Storage temperature	TSTR	-30	80	°C	

6. Electrical Characteristics

Item		Symbol	Rating			Unit	Remark
			Min	Typ	Max		
Supply voltage		VCC	2.5	2.8	3.6	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	GND		Ground
2	LED-		Power for LED backlight cathode
3	LED+		Power for LED backlight anode
4	GND		Ground
5	LCD_ID		ID
6	CABC		The PWM frequency output for LCD driver control.
7	GND		Ground
8	SDO		Serial data output pin used for the SPI Interface.
9	SDI		SDA: Serial data input pin for SPI Interface.
10	SCL		SCL: Serial clock input for SPI interface.
11	GND		Ground
12	CS		chip select signal Low: the chip is selected and accessible High: the chip is not selected and not accessible
13	GND		Ground
14	R7		parallel data bus
15	R6		parallel data bus
16	R5		parallel data bus
17	R4		parallel data bus
18	R3		parallel data bus
19	R2		parallel data bus
20	R1		parallel data bus
21	R0		parallel data bus
22	G7		parallel data bus
23	G6		parallel data bus
24	G5		parallel data bus
25	G4		parallel data bus
26	G3		parallel data bus
27	G2		parallel data bus
28	G1		parallel data bus
29	G0		parallel data bus
30	B7		parallel data bus
31	B6		parallel data bus
32	B5		parallel data bus
33	B4		parallel data bus
34	B3		parallel data bus
35	B2		parallel data bus
36	B1		parallel data bus
37	B0		parallel data bus

38	GND		Ground
39	DE		Data enable signal for RGB interface operation Low: access enabled High: access inhibited
40	HS		Line synchronizing signal for RGB interface operation
41	VS		Frame synchronizing signal for RGB interface operation
42	DCLK		Dot clock signal for RGB interface operation
43	RESET		The external reset input
44	GND		Ground
45	VCI		Power Supply
46	IOVCC		Power Supply
47	YD		NC
48	XR		NC
49	YU		NC
50	XL		NC
51	GND		Ground

7-3 Timing Characteristics

7.5.1 Serial Interface Characteristics (3-line serial):

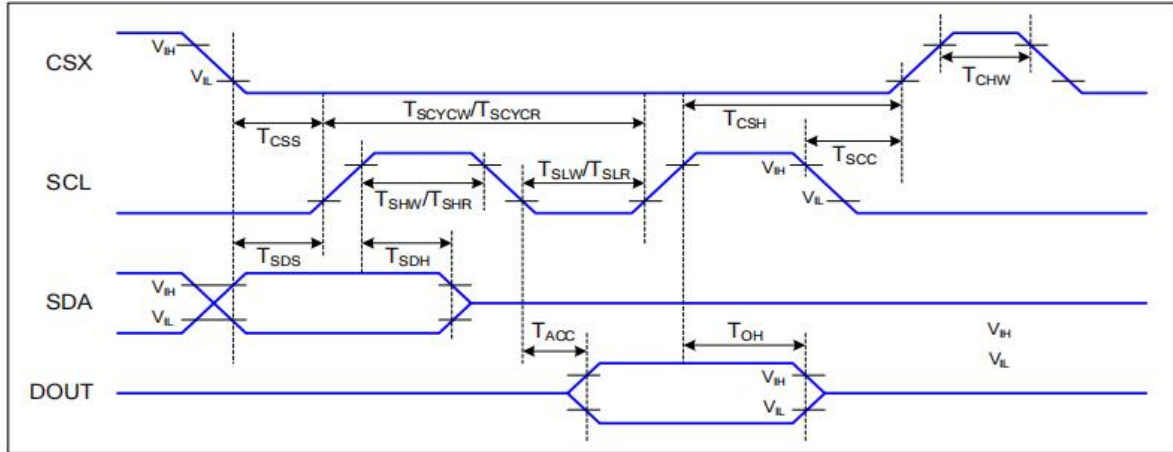


Figure 1 3-line serial Interface Timing Characteristics

VDDI=1.8, VDD=2.8, AGND=DGND=0V, Ta=25°C

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T _{CSS}	Chip select setup time (write)	15		ns	
	T _{CSH}	Chip select hold time (write)	15		ns	
	T _{CSS}	Chip select setup time (read)	60		ns	
	T _{SCC}	Chip select hold time (read)	60		ns	
	T _{CHW}	Chip select "H" pulse width	40		ns	
SCL	T _{SCYCW}	Serial clock cycle (Write)	66		ns	
	T _{SHW}	SCL "H" pulse width (Write)	15		ns	
	T _{SLW}	SCL "L" pulse width (Write)	15		ns	
	T _{SCYCR}	Serial clock cycle (Read)	150		ns	
	T _{SHR}	SCL "H" pulse width (Read)	60		ns	
	T _{SLR}	SCL "L" pulse width (Read)	60		ns	
SDA (DIN)	T _{SDS}	Data setup time	10		ns	
	T _{SDH}	Data hold time	10		ns	
SDO (DOUT)	T _{ACC}	Access time	20	50	ns	Max: CL=30pF Min: CL=8pF
	T _{OH}	Output disable time	50	50	ns	

Table 4 3-line serial Interface Characteristics

Note : The rising time and falling time (Tr, Tf) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

7.5.3 RGB Interface Characteristics :

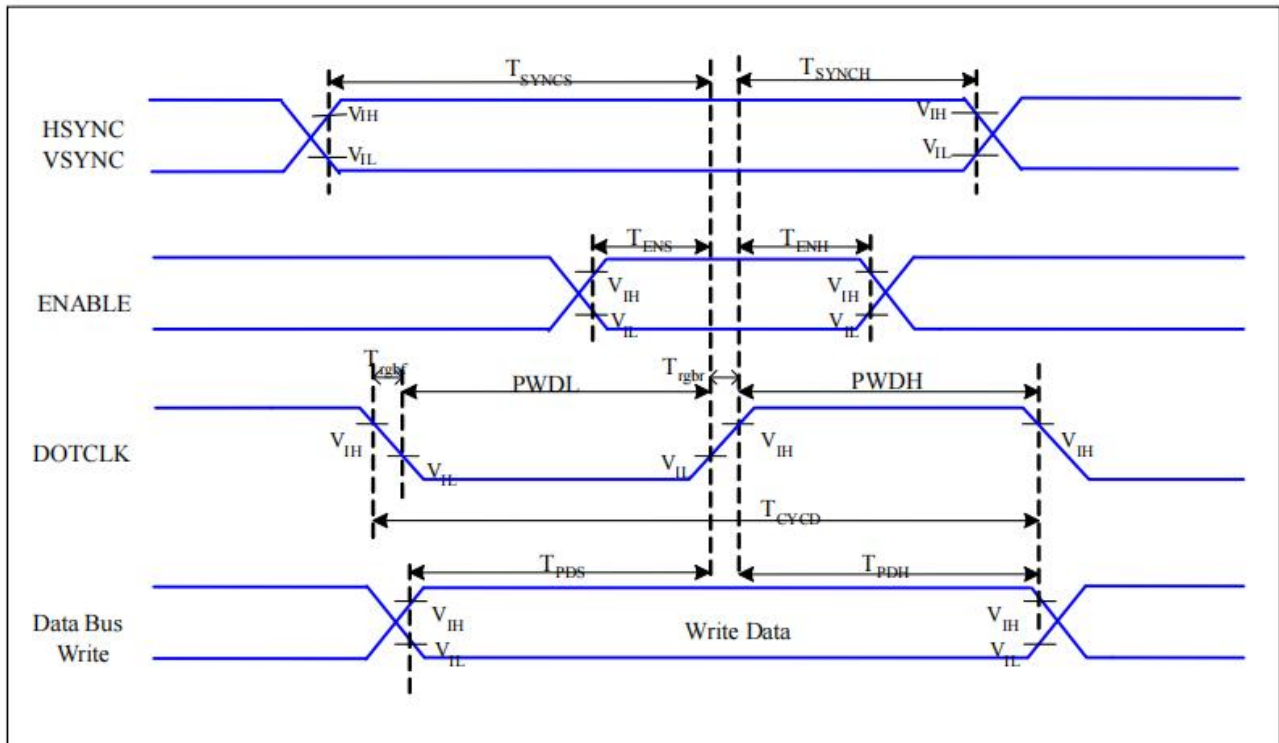


Figure 3 RGB Interface Timing Characteristics

$VDDI=1.8, VDD=2.8, AGND=DGND=0V, Ta=25\text{ }^{\circ}\text{C}$

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T_{SYNCS}	VSYNC, HSYNC Setup Time	5	-	ns	
ENABLE	T_{ENS}	Enable Setup Time	5	-	ns	
	T_{ENH}	Enable Hold Time	5	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	15	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	15	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	33	-	ns	
	T_{rgbr}, T_{rgbf}	DOTCLK Rise/Fall time	-	15	ns	
DB	T_{PDS}	PD Data Setup Time	5	-	ns	
	T_{PDH}	PD Data Hold Time	5	-	ns	

Table 6 18/16 Bits RGB Interface Timing Characteristics

7.5.5 Reset Timing:

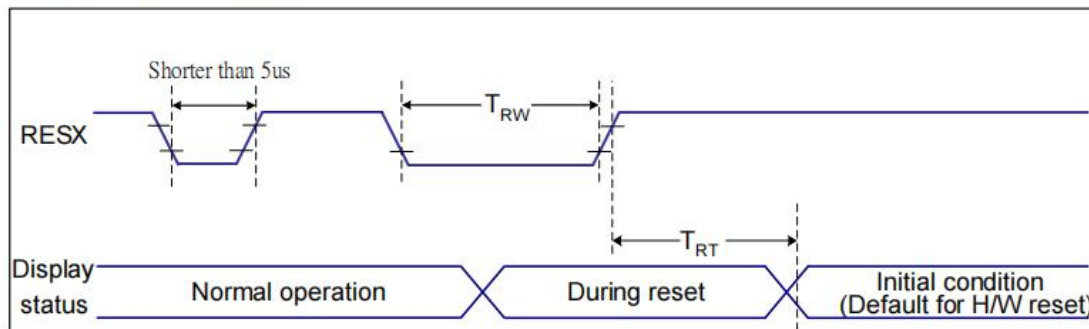


Figure 9 Reset Timing

VDDI=1.8, VDD=2.8, AGND=DGND=0V, Ta=25 °C

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120 (Note 1, 6, 7)	ms

Table 9 Reset Timing

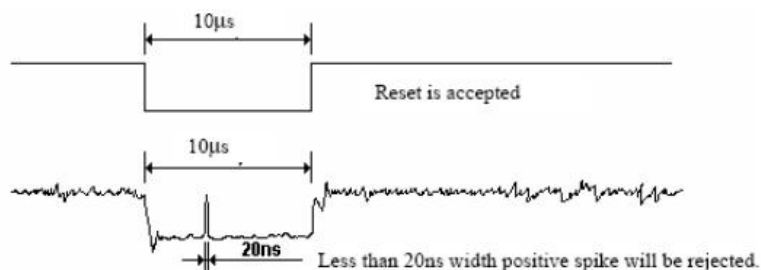
Notes:

1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.
2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:



5. When Reset applied during Sleep In Mode.
6. When Reset applied during Sleep Out Mode.
7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

8. Electro-Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time		Tr +Tf	$\theta_x = \theta_y = 0$	---	25	35	ms	Note 1
Contrast Ratio		CR		700	1000	---	---	Note 2
Transmittance		T%		---	6.0	---	%	
Color Chromaticity (CIE1931)	White	W x	$\theta_x = \theta_y = 0$	---	0.304	---	---	
		W y		---	0.345	---	---	
Viewing angle	θ_T		CR > 10	70	80	---	Deg.	Note 3
	θ_B			70	80	---		
	θ_L			70	80	---		
	θ_R			70	80	---		
模组表面亮度 ($I_F = 20mA$)		L			350	---	cd/m2	Note4

Notes : 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).

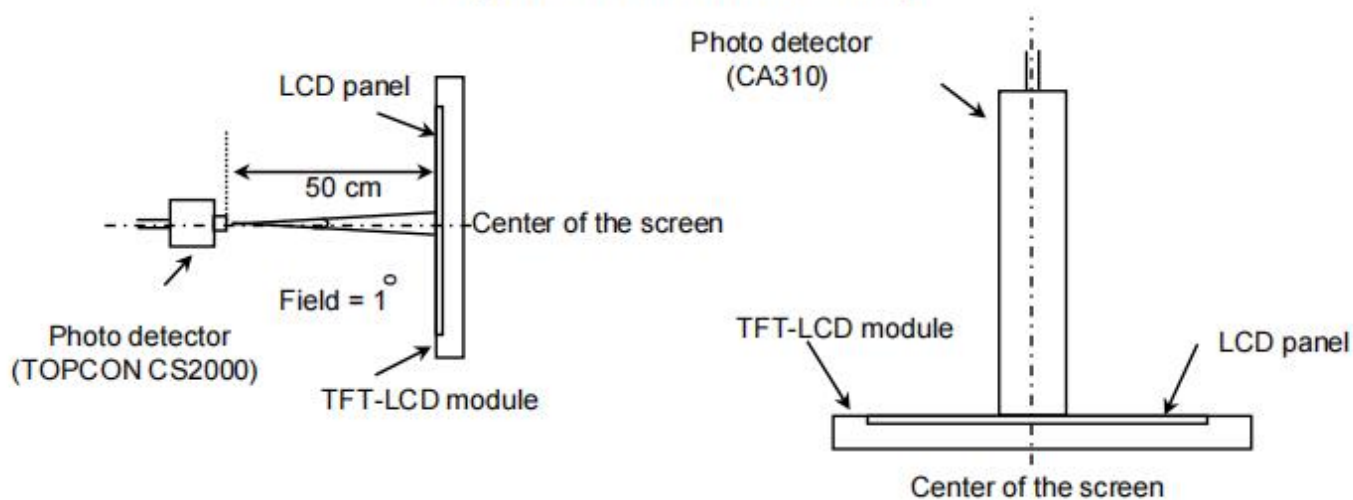
2. Contrast measurements shall be made at viewing angle of $\Theta = 0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

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

3. The color chromaticity coordinates specified in Table 5. shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
4. The electro-optical response time measurements shall be made as FIGURE 2 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

5.2 Optical measurements

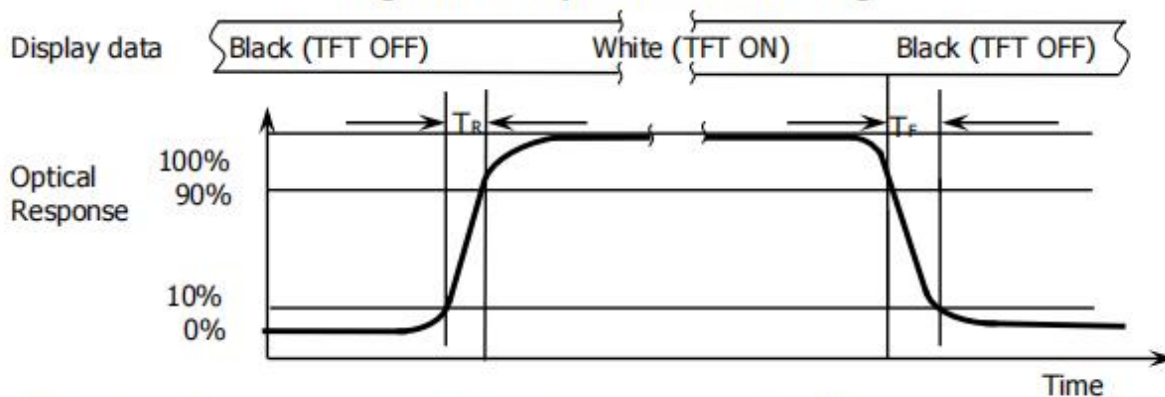
Figure 4. Measurement Set Up



View angel range, uniformity, etc. measurement setup

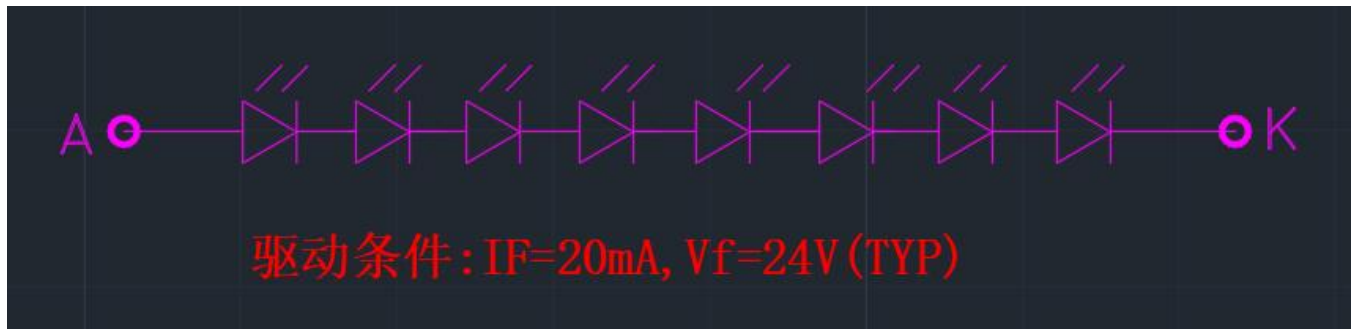
Flicker, measurement setup

Figure 5. Response Time Testing



The electro-optical response time measurements shall be made as shown in FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_r and 90% to 10% is T_d .

Note(4) Backlight circuit



9. Inspection Standards

1. AQL(Acceptable Quality Level)

AQL of major and minor defect

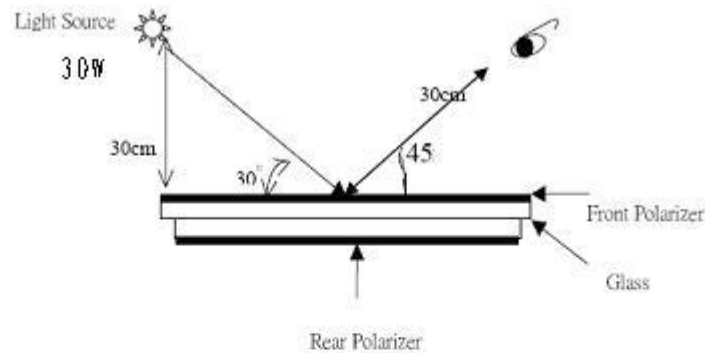
According to GB/T 2828-2003 ; , normal inspection, Class II

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)

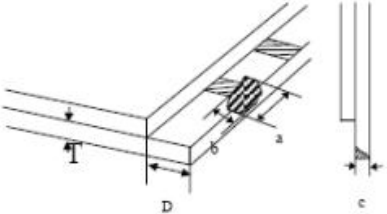
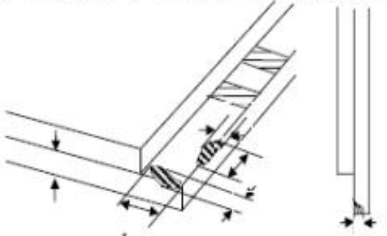


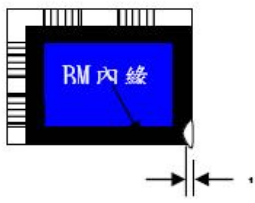
3. Inspection item and criteria

3.1 Visual inspection criterion in immobility

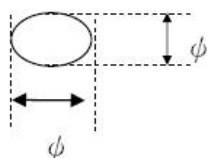
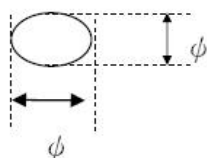
3.1.1 Glass defect

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 cross-section of a panel with a pin. A shaded area represents the damaged conductive region. Dimensions are labeled: 'a' for the length of the damaged area along the pin, 'b' for the width of the damaged area, and 'c' for the thickness of the panel. A vertical dimension 'D' is also shown on the left side of the pin.
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 cross-section of a panel with a pin. A shaded area represents the damaged non-conductive region. Dimensions are labeled: 'a' for the length of the damaged area along the pin, 'b' for the width of the damaged area, and 'c' for the thickness of the panel. A vertical dimension 'T' is shown on the left side of the pin, and 'BM' is indicated near the damaged area.

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

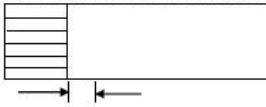
No	Defect item	Criteria		Remark
1	Copper screen peel (Major defect)	Copper screen peel 【 Reject】		
2	No release tape or peel (Major defect)	No release tape or peel 【 Reject】		
3	Dirty dot and impurity of FPC for customer using side (minor defect)	Specification	Allowable	note1: Cannot have stride ITO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

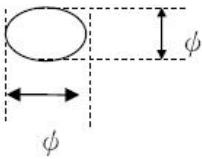
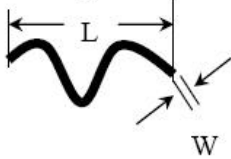
3.1.5 Silicon and Tuffy glue

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	2025-5-9	all	New released