



**SPECIFICATION
FOR
LCD MODULE**

**MODULE NO: AFL800480W-7.0N-7AA0-N
MODULE TYPE: COG+FPC+BL
REVISION NO: A4**

Customer's Approval:

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	SIGNATURE	DATE
PREPARED BY (RD ENGINEER)	YY	
CHECKED BY	BW	
APPROVED BY	XH	

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1. General Description

AFL800480W-7.0N-7AA0-N 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 7.0 inch and the resolution is 800(RGB)*480, The LCM can be easily accessed by micro-controller via parallel interface. The driver ICs are HX8264-D and HX8664-B.

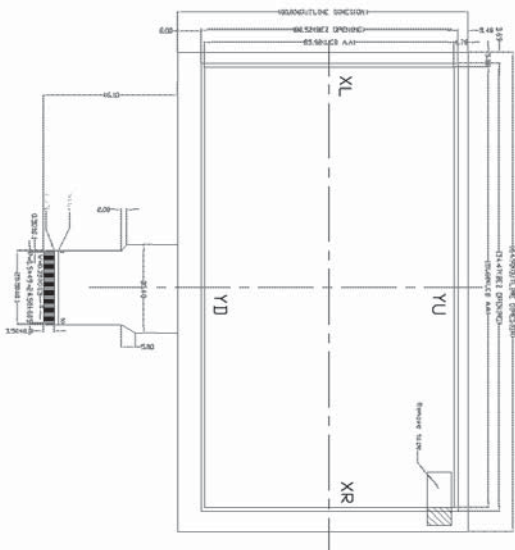

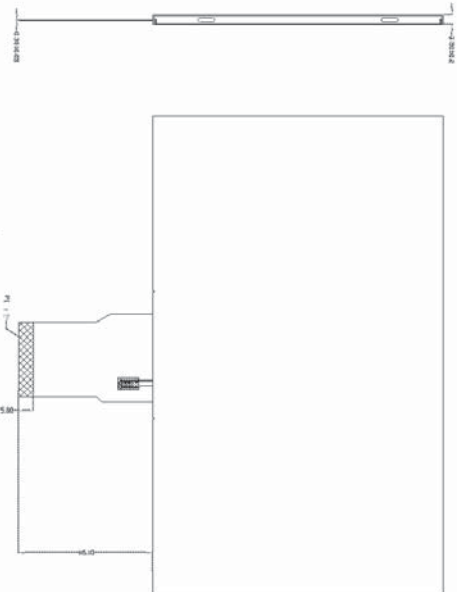
2. Physical Features

Item	Contents
Display Mode	TFT-LCD Module
	Active matrix TFT, Transmissive type
Display Format	Graphic 800×RGB×480 Dot-matrix
Input Data	24 bit RGB interface
Viewing Direction	6 O'clock

3. Mechanical Specification

Item	Contents	Unit
Module size (W×H×T)	164.9X100X3.5	Mm
Number of dots	800(RGB) × 480	dots
Active area (W×H)	153.6X84.64	mm

4. Outline Dimension

SHANTOU SEALANT ELECTRICAL CO., LTD	DRAWN: 卢悦雁 2012-7-9	CHECKED: 郭晓辉 2012-7-9	APP: 郭晓辉 2012-7-9	PO: SND-W70007A-LCM-A1																																																		
<p>NOTES:</p> <ol style="list-style-type: none"> 1. DISPLAY: 7.0" TFT TRANSMISSIVE 2. VIEWING DIRECTION: 6 O'CLOCK 3. ALL MATERIAL AND PROCESSING SHOULD BE LEAD FREE 4. OPERATING TEMP: -20°C-----70°C 5. STORAGE TEMP: -30°C-----80°C 6. ROHS REQUEST 7. UNSPECIFIED TOLERANCES IS ±0.2MM 																																																						
<p>CIRCUIT DIAGRAM: S×3=15 LED BRIGHTNESS: 310CD/M² MIN, @ILED=100mA</p> 																																																						
																																																						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>1. WLED</td><td>268.65L</td></tr> <tr><td>2. WLED</td><td>277.69D</td></tr> <tr><td>3. WLED</td><td>298.87L</td></tr> <tr><td>4. WLED</td><td>299.86S</td></tr> <tr><td>5. DRN</td><td>200.86S</td></tr> <tr><td>6. KCH4</td><td>91.84</td></tr> <tr><td>7. DWV0</td><td>26.824</td></tr> <tr><td>8. HD06</td><td>34.82</td></tr> <tr><td>9. HPC</td><td>34.8L</td></tr> <tr><td>10. VSYNC</td><td>35.80</td></tr> <tr><td>11. BUSYNC</td><td>36.65D</td></tr> <tr><td>12. D17</td><td>37.6CCK</td></tr> <tr><td>13. H6</td><td>38.65D</td></tr> <tr><td>14. H6</td><td>39.67R</td></tr> <tr><td>15. H4</td><td>40.67D</td></tr> <tr><td>16. H2</td><td>41.68L</td></tr> <tr><td>17. H2</td><td>42.68L</td></tr> <tr><td>18. H1</td><td>43.690</td></tr> <tr><td>19. H0</td><td>44.695C</td></tr> <tr><td>20. H7</td><td>45.695C</td></tr> <tr><td>21. H6</td><td>46.695C</td></tr> <tr><td>22. H5</td><td>47.695C</td></tr> <tr><td>23. H4</td><td>48.695C</td></tr> <tr><td>24. H3</td><td>49.695C</td></tr> <tr><td>25. H2</td><td>50.695C</td></tr> </table>					1. WLED	268.65L	2. WLED	277.69D	3. WLED	298.87L	4. WLED	299.86S	5. DRN	200.86S	6. KCH4	91.84	7. DWV0	26.824	8. HD06	34.82	9. HPC	34.8L	10. VSYNC	35.80	11. BUSYNC	36.65D	12. D17	37.6CCK	13. H6	38.65D	14. H6	39.67R	15. H4	40.67D	16. H2	41.68L	17. H2	42.68L	18. H1	43.690	19. H0	44.695C	20. H7	45.695C	21. H6	46.695C	22. H5	47.695C	23. H4	48.695C	24. H3	49.695C	25. H2	50.695C
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<p>UNITS: MM SHEET 1 OF 1</p>																																																						

5. Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VCC	0.3	5.0	V	Note1, Note2
Input Voltage	VIN	-0.3	5.0	V	
Operating temperature	To	-20	70	°C	
Storage temperature	Ts	-30	80	°C	
Humidity			90	%RH	

Remark:

Note 1) The driver IC may be permanently damaged if it is used under the condition exceeding the above absolute maximum values. It is also recommended to use the driver IC within the limit of its electric characteristics during normal operation. Exceeding the conditions may lead to malfunction of it and affect its credibility.

Note 2) The voltage from VSS.

6. Electrical Characteristics

TFT LCD Module

Item	Symbol	Rating			Unit	Remark
		Min	Typ	Max		
Power Voltage	VCC	3.0	3.3	3.6	V	GND=0V
	VGH	12.5	15.4	24.5	V	GND=0V
	VGL	-10	-5.2	-3.0	V	GND=0V
	AVDD	8.0	9.3	12	V	AGND=0V
	VCOM	2.0	3.0	4.0	V	GND=0V
Input Voltage	VIL	GND		0.3*VCC	V	VCC=3.0~ 3.6V
	VIH	0.7* VCC		VCC	v	
Current of power supply	IVCC		7	12	mA	VCC=3.3V
	IAVDD		10	25	mA	
	IGH		0.2	1.0	mA	
	IGL		0.2	1.0	mA	

Remark: Note1: Vcom must be adjusted to optimize display quality: Cross-talk, Contrast Ratio and etc.

Back-Light Unit

Item	Symbol	Rating			Unit	Remark
		Min	Typ	Max		
Forward voltage	Vf		9.6		V	
Forward current	If		100		mA	
Power Consumption			0.96		W	

Note:

(1) Permanent damage may occur to the LCD module if beyond this specification.

Functional

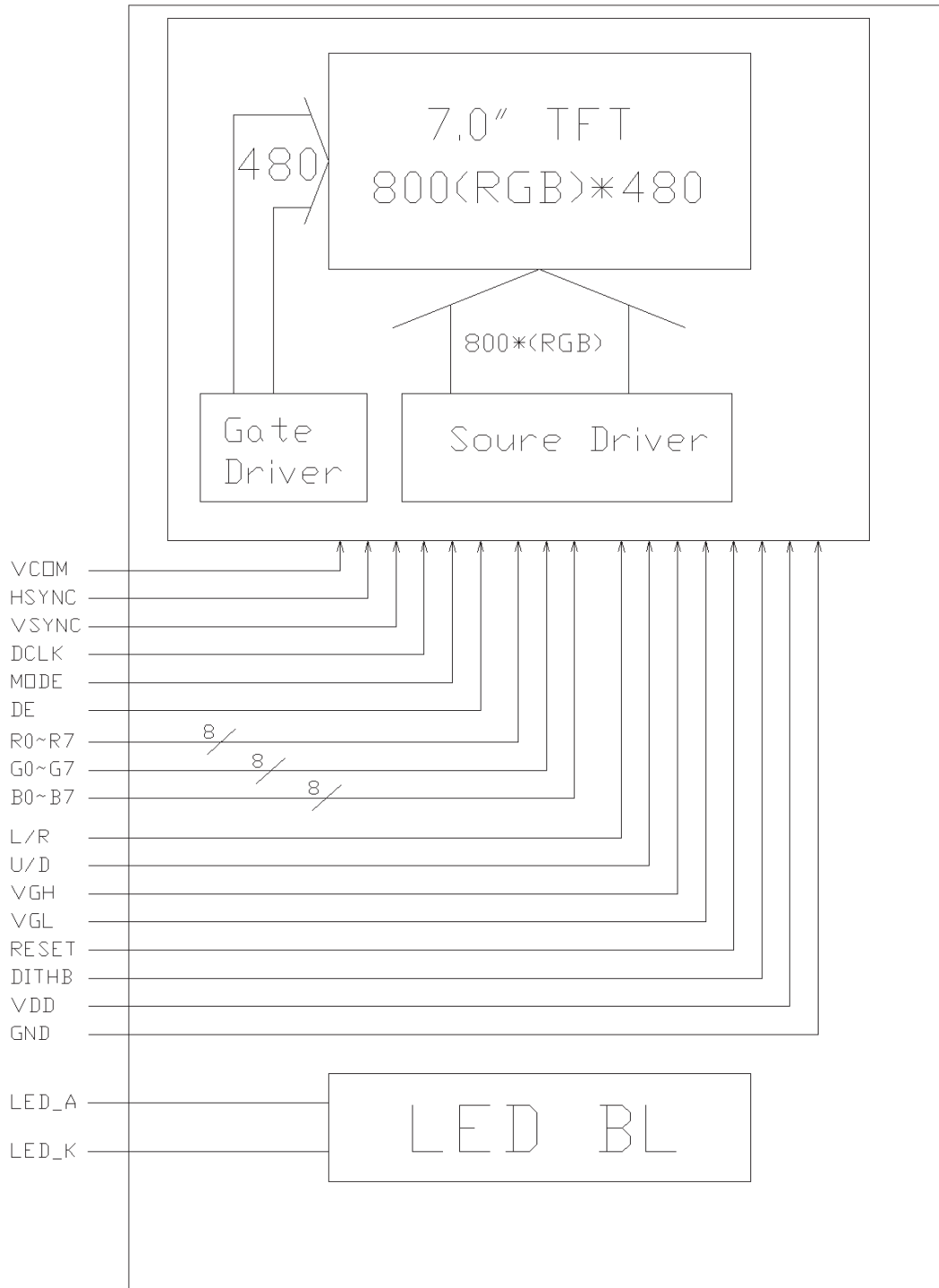
operation should be restricted to the conditions described under normal operating conditions.

(2) $T_a = 25 \pm 2^\circ\text{C}$

(3) Test Condition: LED current 100 mA

7. Module Function Description

7.1 Block Diagram Of LCM



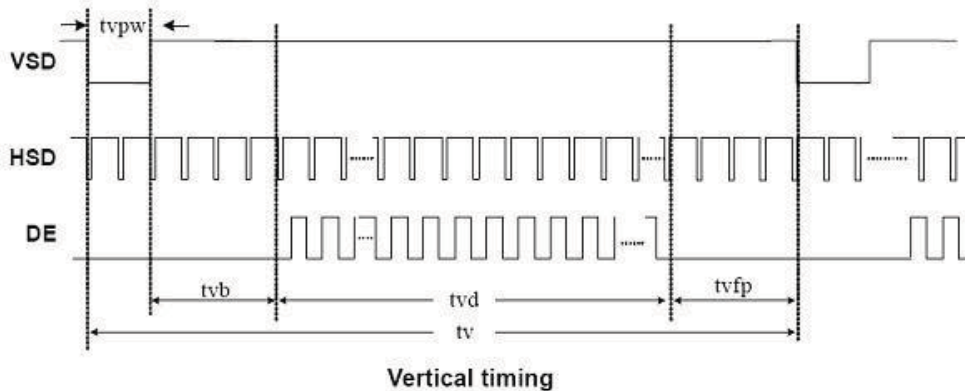
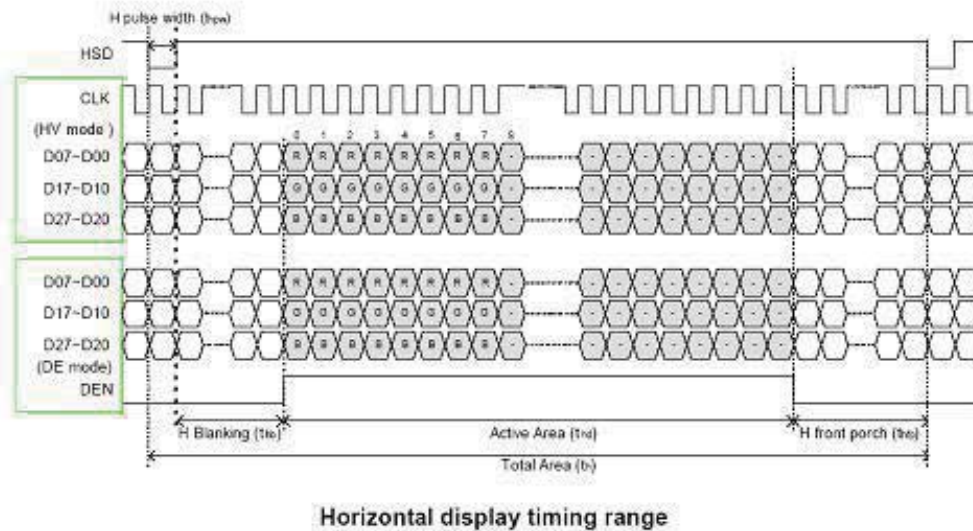
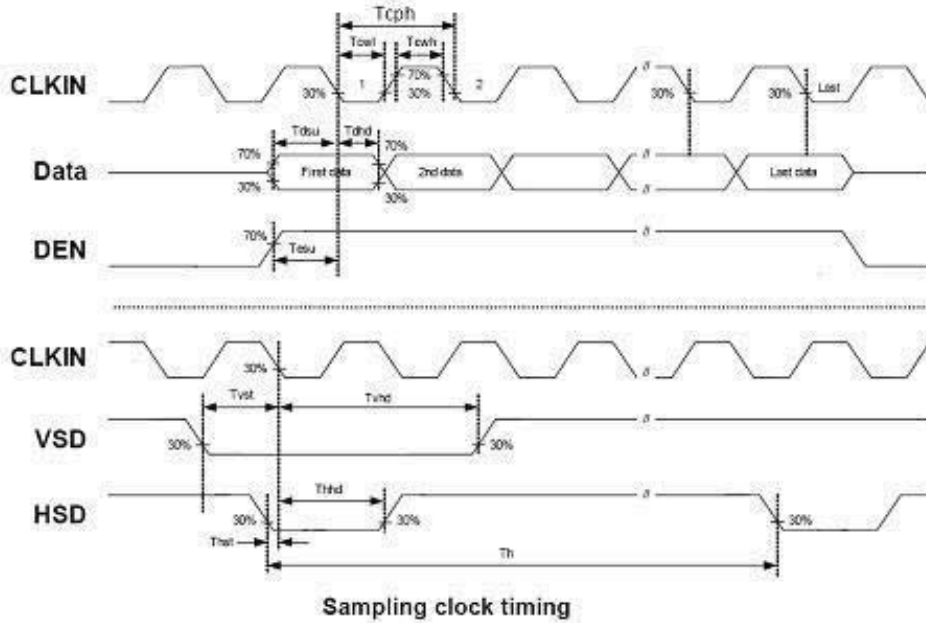
7.2 Pin Description

Terminal No.	Symbol	IO	Functions
1--2	VLED+	P	Power for LED backlight (Anode)
3--4	VLED-	P	Power for LED backlight (Cathode)
5	GND	P	Analog Ground
6	VCOM	I	Common voltage
7	DVDD	P	Power for Digital Circuit
8	MODE	I	DE/SYNC mode select, Normally pull high. MODE="1": DE mode. (Default) MODE="0": HSD/VSD mode.
9	DE	I	Data Input Enable
10	VSYNC	I	Vertical Sync Input
11	HSYNC	I	Horizontal Sync Input
12	B7	I	Blue data(MSB)
13	B6	I	Blue data
14	B5	I	Blue data
15	B4	I	Blue data
16	B3	I	Blue data
17	B2	I	Blue data
18	B1	I	Blue data
19	B0	I	Blue data
20	G7	I	Green data(MSB)
21	G6	I	Green data
22	G5	I	Green data
23	G4	I	Green data
24	G3	I	Green data
25	G2	I	Green data
26	G1	I	Green data
27	G0	I	Green data (LSB)

28	R7	I	Red data(MSB)
29	R6	I	Red data
30	R5	I	Red data
31	R4	I	Red data
32	R3	I	Red data
33	R2	I	Red data
34	R1	I	Red data
35	R0	I	Red data
36	GND	P	Power Ground
37	DCLK	I	Sample clock
38	GND	P	Power Ground
39	L/R	I	<p>Left / right selection, Normally pulled high. SHLR="1": Shift right: first data=S1<-S2<-S3..... <-S1200=last data SHLR="0": Shift left: last data=S1->S2->S3..... ->S1200=first data.</p>
40	U/D	I	<p>Up/down selection, Normally pulled low. UPDN="0": STV2 output vertical start pulse and UD pin output logical "0" to gate driver. (Default) UPDN="1": STV1 output vertical start pulse and UD pin output logical, "1" to gate driver</p>
41	VGH	P	Gate ON Voltage
42	VGL	P	Gate OFF Voltage
43	AVDD	P	Power for Analog Circuit
44	RESET	I	Global reset pin.
45	NC	-	No connection
46	VCOM	I	Common Voltage
47	DITHB	I	Dithering function
48	GND	P	Power Ground
49	NC	-	No connection
50	NC	-	No connection

7.3 Timing Characteristics

7.3.1 Data Input Format

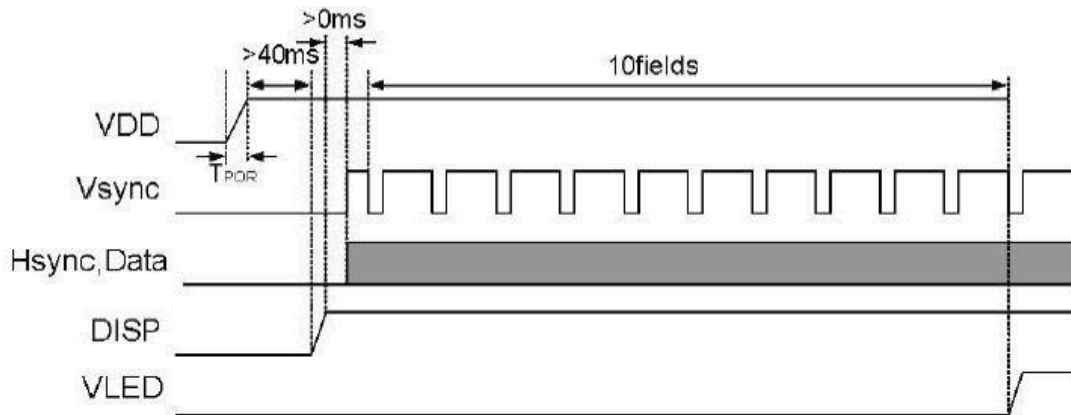


7.3.2 AC Electrical Characteristics

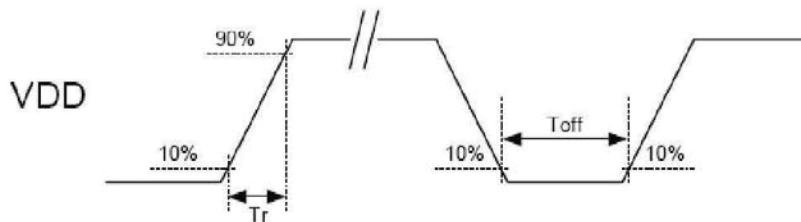
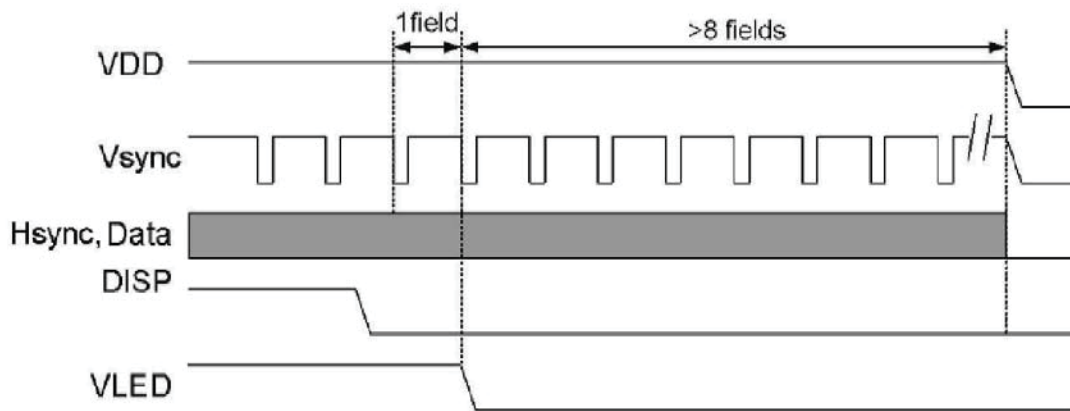
Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK cycle time	Tcph	25			ns	
DCLK frequency	fclk		30	40	MHz	
DCLK pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8			ns	
VSD hold time	Tvhd	8			ns	
HSD setup time	Thst	8			ns	
HSD hold time	Thhd	8			ns	
Data setup time	Tdsu	8			ns	
Data hold time	Tdhd	8			ns	
DE setup time	Tesu	8			ns	
DE hold time	Tehd	8			ns	
Horizontal display area	thd		800		Tcph	
HSD period time	th		928		Tcph	
HSD pulse width	thpw	1	48		Tcph	
HSD back porch	thb		40		Tcph	
HSD front porch	thfp		40		Tcph	
Vertical display area	tvd		480		th	
VSD period time	tv		525		th	
VSD pulse width	tvpw		3		th	
VSD back porch	tvb		29		th	
VSD front porch	tvfp		13		th	

7.3.3 Power on/off Sequence

Power On Sequence



Power Off Sequence



VDD power input timing

Notes:

Data include R0~R7, G0~G7, B0~B7, HSD, VSD, DCLK, DE;

Power on sequence: VDD->DISP->Data->VLED;

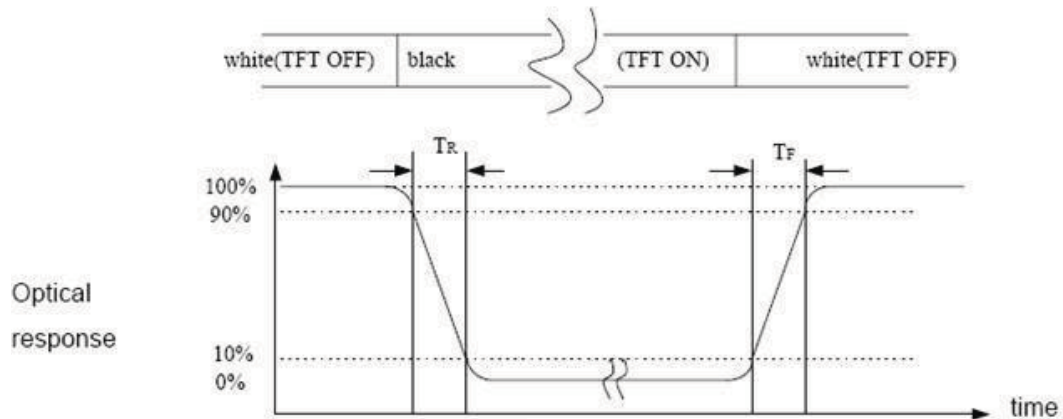
Power off sequence: DISP->VLED->Data->VDD;

VDD power input timing: $0.5\text{ms} < T_r < 10\text{ms}$, $T_{off} > 500\text{ms}$.

8. Electro-Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Response time	Tr +Tf	$\theta_x = \theta_y = 0$	/	30	45	ms	Note 1
Contrast Ratio	CR		200	250	/	/	Note 2
Transmittance	T%		6.4	7.0			
Color chromaticity	Wx	$\theta_x = \theta_y = 0$	0.287	0.307	0.327		Reference Only
	Wy		0.325	0.345	0.365		
	Rx		0.589	0.609	0.629		
	Ry		0.297	0.317	0.337		
	Gx		0.297	0.317	0.337		
	Gy		0.523	0.543	0.563		
	Bx		0.117	0.137	0.157		
	By		0.141	0.161	0.181		
Viewing angle	θ_L	CR ≥ 10	/	50	/	Deg.	Note 3
	θ_R			50			
	θ_U			60			
	θ_D			55			
Luminance ($I_F = 100mA$)	L		240	300	/	cd/m ²	Note4

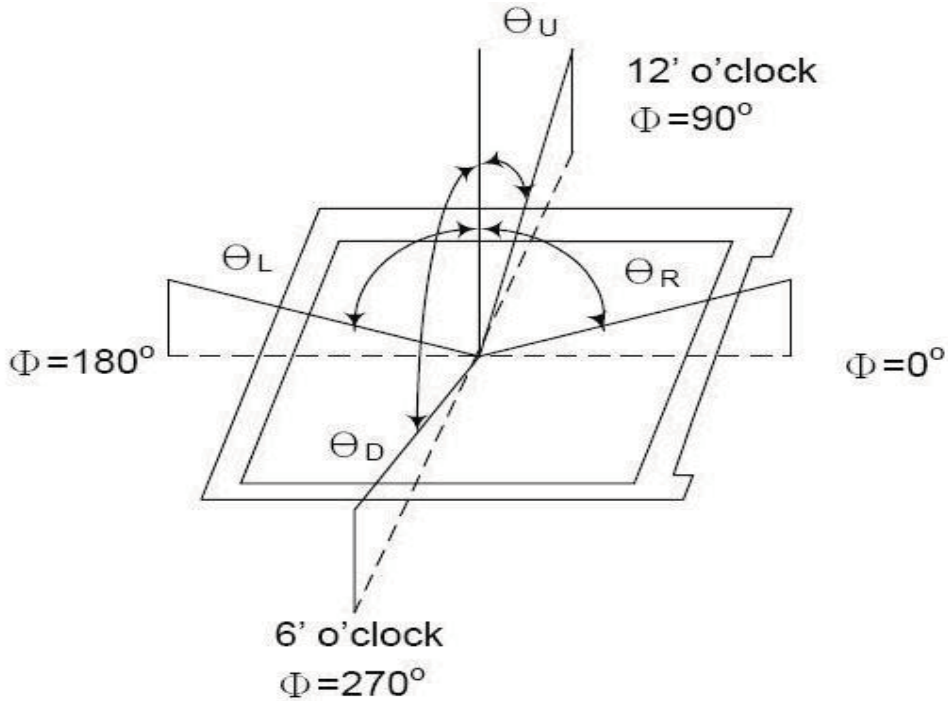
Note(1) Definition of Response Time:Sum of T_R and T_F



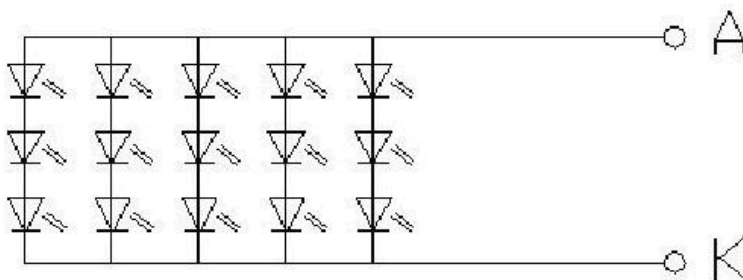
Note (2) Definition of Contrast Ratio(CR):measured at the center point of panel

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

Note (3) Definition of Viewing Angle x and y:



Note(4) Backlight circuit



9. Reliability

NO.	Item	Condition	Criterion
1	High Temperature Storage	80 °C, 96Hrs	No abnormalities in function and appearance
2	High Temperature Operatign	70 °C, 96Hrs	
3	Low Temperature Storage	-30 °C, 96Hrs	
4	Low Temperature Operating	-20 °C, 96Hrs	
5	High Temperature/Humidity Non-Operating Test	40 °C,90%RH, 96Hrs	
6	Thermal Shoc Test	-20 °C(60Min)↔25 °C(5Min)↔60 °C(60Min) 10 Cycles	

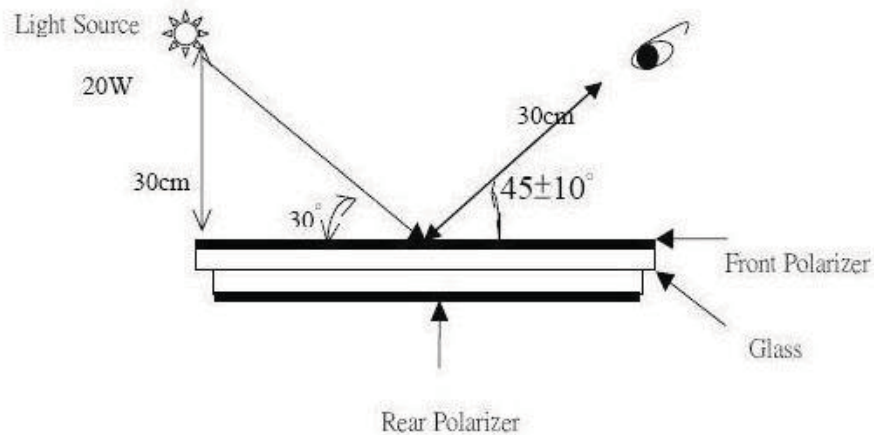
10. Inspection Standards

10.1 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!

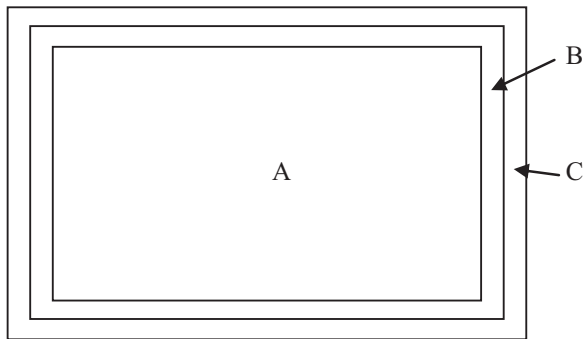
(As shown below)



10.2 Inspection item and criteria

10.2.1 Definitions

1.1 Definitions of Display Area, Visible Area and Invisible Area



A: Display Area (D.A.)

B: Visible Area (V.A.)

C: Invisible Area (I.A.: After it is assembled, this area is invisible. Thus, the appearance defects of this area are Negligible.)

1.2 Defect Level and AQL Value

Level	Defect Descriptions	AQL
Serious Defect	Imperfect display, over display, not-shining backlight and size beyond the blueprint.	0.4
Light Defect	Black and white points, bright/dark points (discovered through electrical logging), Glass breakage, bubbles, linear defects , bubbles between spectrometer cliff and glass.	1.0

1.3 Sampling Standards: GB2828 (MIL-STD-105E) General inspection level II

1.4 Definitions of Point Defects (Pixel Defects)

1.4.1 Pixel and Sub-pixel (refer to the following diagram)



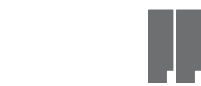
A pixel = (a red sub-pixel + a green sub-pixel + a blue sub-pixel)

1.4.2 Definition of Point: if the area of a defect point is greater than half area of a sub-pixel, this defect point is considered as a point defect.

1.4.3 Bright Point: a very bright point, whose size does not change during the test screen changes, probably is noticed in the dark test screen.

1.4.4 Dark Point: a dim point, whose size does not change during the test screen changes, probably is noticed in the pure red/green/blue test screen.

1.4.5 Two Adjacent Points (Refer to the following diagram)



Right and left adjacent points



Up and down adjacent points



Diagonal adjacent points




* In this part , the black pixel point(s) refer(s) to the defect point(s), the grey pixel point(s) refer(s) to normal point(s).


2.0 Functionality Requirement

2.1 Functional Defects

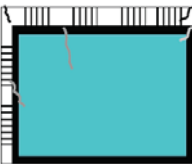
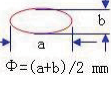
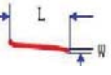
Defect Description	Schematic or Explanation	Criteria	Defect Level
Imperfect Display	Lack of vertical lines, horizontal lines or do not display, etc.	Not allowed	Serious Defect
Over Display	Too much vertical lines, horizontal lines, cross-lines, or do not display, etc.	Not allowed	Serious Defect

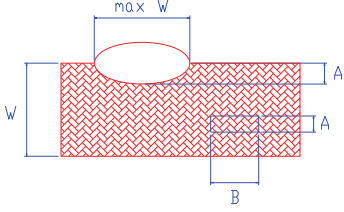
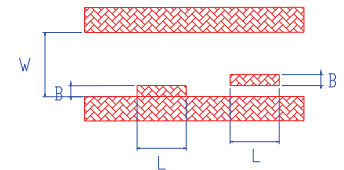
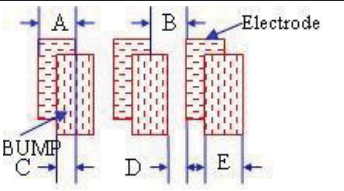
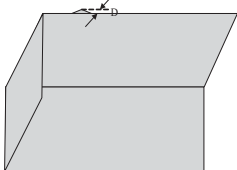
2.2 Point Defects (Bright Point and Dark Point)



Defect Description	Schematic or Explanation	Criteria Acceptable Quantity (V.A. & D.A.)				Defect Level	
		< 3.5 \times	3.5 ~ 4.3	4.3 ~ 7.0	\geq 7.0		
Bright Point	Normal black screen:  Every sub-pixel is dark.	Red/Green/Blue Bright Point	1	2	2	3	Light Defect
	Green bright point: In the black screen,  every sub-pixel should be dark. However, the green sub-pixel is bright.	Adjacent Points	0	0	0	0	
Dark Point	Normal white screen: Every sub-pixel is bright. 	Red/Green/Blue Dark Point	2	3	4	5	Light Defect
	Green dark point: In the white screen, every sub-pixel should be bright. However, the green sub-pixel is	Adjacent Points	1	1	1	1	

	dark. (Equally applied to pure red/green/blue test screen)						
							
Notes	The total quantity of point defects should be equal or less than		3	4	5	5	
	The least distance between two point defects is 5mm.						

2.3 Appearance Defects

Defect Description	Schematic or Explanation	Criteria Acceptable Quantity (V.A. & D.A.)				Defect Level	
		< 3.5	3.5 ~ 4.3	4.3 ~ 7.0	≥ 7.0		
Glass Cracks		Not allowed	Not allowed	Not allowed	Not allowed	Light Defect	
Circular Defects (Black Point/ White Point)	 The least distance between defects is 5mm.	$\Phi \leq 0.10\text{mm}$	Neglect	Neglect	Neglect	Neglect	Light Defect
		$0.10\text{mm} < \Phi \leq 0.15\text{mm}$	2	3	3	3	
		$0.15\text{mm} < \Phi \leq 0.20\text{mm}$	1	1	2	2	
		$0.20\text{mm} < \Phi \leq 0.25\text{mm}$	1	1	1	2	
		$0.25\text{mm} < \Phi \leq 0.30\text{mm}$	0	1	1	1	
		$\Phi > 0.30\text{mm}$	0	0	0	0	
		Note: the number of these defects, including point defects, is acceptable at most.	3	4	5	5	
Linear Defects (Black Line/ White Line)		$W \leq 0.03\text{mm} \ \& \ L \leq 1.0\text{mm}$	Neglect	Neglect	Neglect	Neglect	Light Defect
		$W \leq 0.05\text{mm}, \ L \leq 2.0\text{mm}$	2	2	3	3	
		$0.05\text{mm} < W \leq 0.10\text{mm}, \ L \leq 2.0\text{mm}$	1	1	2	3	
		$W > 0.1\text{mm} \ \text{or} \ L > 2.0\text{mm}$	Decided by circular defects				
Polarizer	Refer to	$\Phi \leq 0.15\text{mm}$	Neglect	Neglect			

Indentation, Bubbles	Circular Defects.	$0.15\text{mm} < \Phi \leq 0.20\text{mm}$	2	3	Defect
	The least distance between defects is 5mm.	$0.20\text{mm} < \Phi \leq 0.30\text{mm}$	2	2	
		$\Phi > 0.30\text{mm}$	0	0	
		Note: the number of these defects, including point defects, is acceptable at most.	3	4	
Polarizer Scratch	Refer to Linear Defects.		Refer to Linear Defects.		Light Defect
FPC Defects: Pinhole Defects, Line Defects	 W: Width.	$A \leq W/4$ AND $B \leq 3W$, NEGLECT. $A > W/4$ OR $B > 3W$, REJECTION			Light Defect
FPC Defects: Etching Adverse (Wires Protuberance/ Copper Residual/ Burrs)	 W: Width between wires.	$B \leq W/4$ AND $L \leq 3W$, Immovable, NEGLECT $B > W/4$ OR $L > 3W$, movable, REJECTION			Light Defect
FPC Defects: Crease/ Indentation	N/A	Acute Angle Crease, REJECTION Not-acute Angle Crease/ Indentation, NEGLECT			Light Defect
SMT : Deviation of Component Welding		$C \geq E/2$ AND $D \geq B/2$, NEGLECT $C < E/2$ OR $D < B/2$, REJECTION			Light Defect
Iron Frameworks		Allowable burr size on edges: $D < 0.05\text{mm}$, NEGLECT $D \geq 0.05\text{mm}$, REJECTION			Light Defect
Touch Screen - Black Point/ White Point	Refer to Circular Defects.		Refer to Circular Defects.		Light Defect
Touch Screen - Pit	Refer to Polarizer Indentation.		Refer to Polarizer Indentation.		Light Defect

Touch Screen - Scratch	Refer to Linear Defects.	Refer to Linear Defects.	Light Defect
Touch Screen - Newton's Ring	Regular Newton's Ring:  Irregular Newton's Ring: 	Area of Newton's Ring \leq 1/3 Total Display Ares, NEGLECT. Area of Newton's Ring $>$ 1/3 Total Display Ares, REJECTION. Area of Newton's Ring \leq 1/2 Total Display Ares, NEGLECT Area of Newton's Ring $>$ 1/2 Total Display Ares, REJECTION Note: if Newton's Ring ca uses graphic distortion, please REJECT.	Light Defect

11. Precautions For Using LCD Modules

11.1 Mounting method

The LCD panel of Daxian LCD module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

11.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from eingcontaminated:

- Soldering flux
- Chlorine (Cl) , Salfur (S)

If goods were sent without being sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (Cl), Salfur (S) from customer, Responsibility is on customer.

11.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you: Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

12. Records of Version

REVISION HISTORY

Rev	Content	Date
A0	New released	2012-6-13
A1	REMOVE TP	2012-7-9
A2	Indicate ic are HX8264-D and HX8664-B, see page 3; Indicate Electrical Characteristics detaily, see page 5;	2012-8-23
A3	Add Current of power supply, detail see page 5 Modify BL Luminance, detail see page 13	2012-9-8
A4	Charge the power supply, detail see page 5	2012-12-10