

江华飞信达科技有限公司

JIANG HUA FEXDA Technology Co. Ltd

SPECIFICATION FOR LCD MODULE

Customer : _____
Product Model: FXD050WV53B-A
Sample code: _____

Designed by	Checked by	Approved by

Final Approval by Customer

<input type="checkbox"/> LCM Machinery OK Checked By _____	<input type="checkbox"/> LCM OK
<input type="checkbox"/> LCM Display OK Checked By _____	<input type="checkbox"/> NG, Problem survey: Approved By _____

※ The specification of “TBD” should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.

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1. Scope

This specification applies to the TFT LCD module which is designed and manufactured by LCM Factory of JIANGHUA FEXDA Technology Co. Ltd.

2. Normative Reference

GB/T4619-1996 《Liquid Crystal Display Test Method》

GB/T2424 《Basic environmental Testing Procedures for Electric and Electronic Products.》

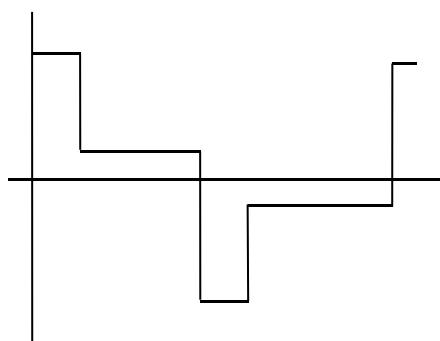
GB/T2423 《Basic Testing Procedures for Electric and Electronic Products》

IEC61747-1 《SIXTH PART GB2828`2829-87 《National Standard of PRC》

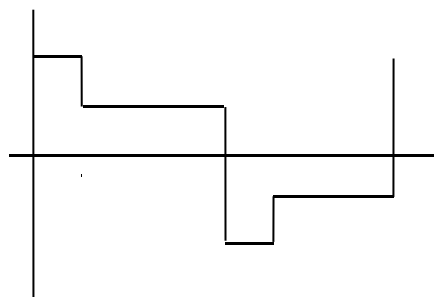
3. Definitions

3.1 Definitions of Vop

The definitions of threshold voltage V_{th1} , V_{th2} the following typical waveforms are applied on liquid crystal by the method of equalized voltage for each duty and bias.



【 selected waveform 】



【 non-selected waveform 】

① V_{th1} : The voltage which the brightness of segment indicates 50% of saturated value on the conditions of selected waveform

($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

② V_{th2} : The voltage which the brightness of segment indicates 50% of saturated value on the conditions of non-selected waveform

($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

③ V_{op} : ($V_{th1}(50\%)+V_{th2}(50\%)$)/2 ($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

3.2 Definition of Response Time T_r , T_d

① T_r : The time required which the brightness of segment becomes 10% from 100% when waveform is switched to selected one from non-selected one. ($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

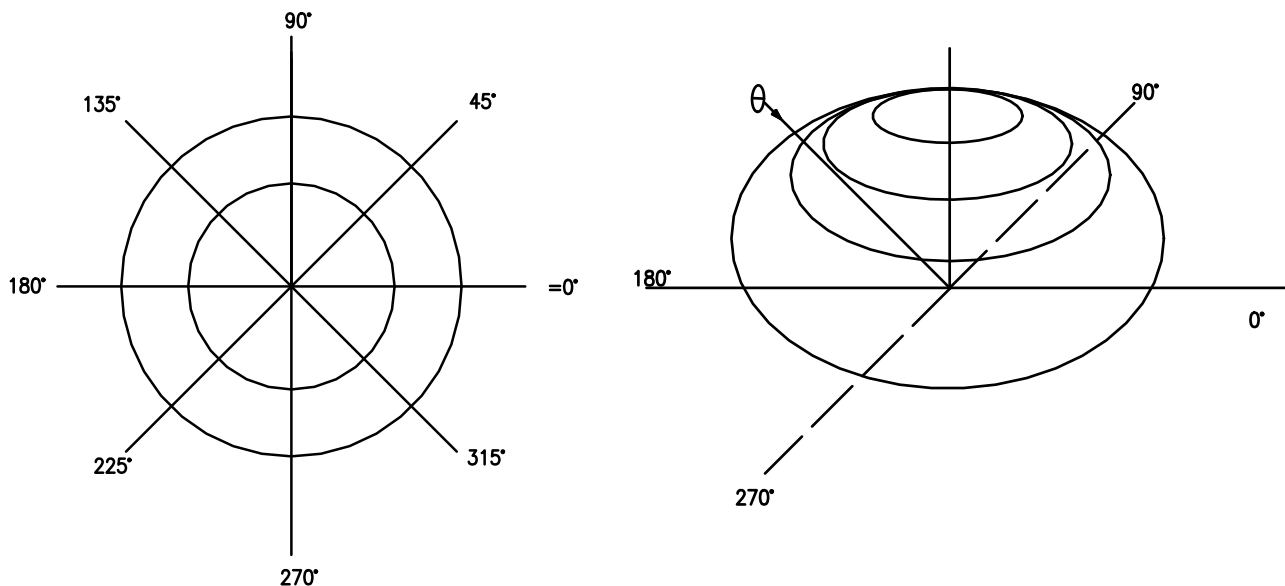
② T_d : The time required which the brightness of segment becomes 90% from 10% when waveform is switched to selected one from selected one. ($f_r=80\text{Hz}$, $\Phi=10^\circ$ $\theta=270^\circ$ at 25°C)

3.3 Definition of Contrast Ratio Cr

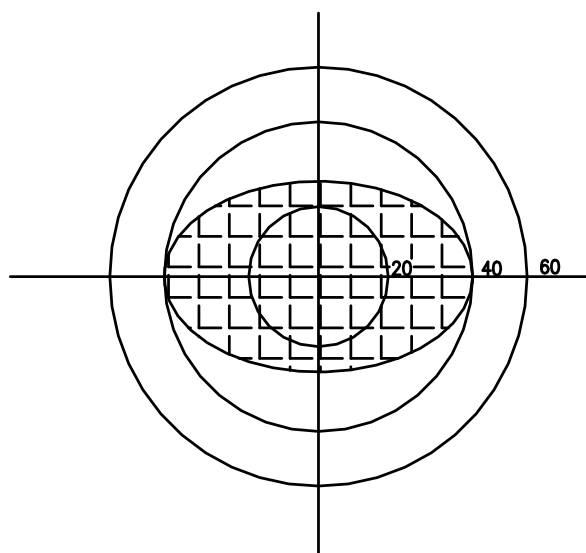
$$Cr=A/B$$

- ① A: Segments brightness in case of non-selected waveform
- ② B: Segments brightness in case of selected waveform

3.4 Definition of Angle and Viewing Range



Angular Graph: Constrast Ratio



Such as:
Viewing Angle Range:
80(Cr>2) Horizontal
70(Cr>2) Vertical

4. Technology Specifications

4.1 Features

The LCD adopts one backlight with High brightness 12-lamps white LED.

Construction: .5.0" a-Si color TFT-LCD , White LED backlight and FPC .

4.2 General Specifications

No.	Item	Specification
1	LCD size	5.0 inch
2	Resolution	800 (RGB)X480
3	Display mode	Normally Black
4	Pixel pitch	0.045 (H) X 0.135 (V) mm
5	Active area	108(H) x 64.8(V) mm
6	Module size	120.75(H)X75.8(V)X2.8(D)mm
7	Pixel arrangement	RGB-stripe
8	Interface	RGB 24bit

4.3 Interface Pin Connection

Pin No	Symbol	Description
1	LEDK	Power Supply For LED Backlight Cathode Input.
2	LEDA	Power Supply For LED Backlight Anode Input.
3	GND	Ground.
4	VDD	Power Supply For LCD.
5~12	R0~R7	RED Data bus
13~20	G0~G7	GREEN Data bus
21~28	B0~B7	BLUE Data bus
29	GND	Ground.
30	PCLK	Dot clock signal for RGB interface operation.
31	DISP	DISP sets the display mode. DISP=L:Standby mode DISP=H:Normal display mode
32	HSYNC	Line synchronous signal for RGB interface operation.
33	VSYNC	Frame synchronous signal for RGB interface operation.
34	DE	Data enable signal for RGB interface operation.
35	NC	Dot clock signal for RGB interface operation.
36	GND	DISP sets the display mode. DISP=L:Standby mode DISP=H:Normal display mode
37	NC	-
38	NC	-
39	NC	-
40	NC	-

4.4 DC Characteristics

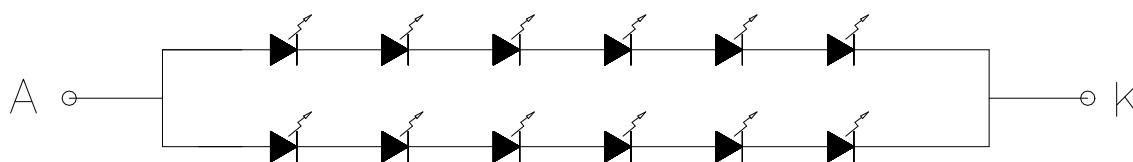
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Analog Supply Voltage	V _{DD}	3.0	3.3	3.6	V	-
Input High Voltage	V _{IH}	0.7V _{DD}	-	V _{DD}	V	Digital input pins
Input Low Voltage	V _{IL}	GND	-	0.3V _{DD}	mA	Digital input pins
Output High Voltage	V _{oH}	0.8V _{DD}	-	V _{DD}	mA	Digital input pins
Output High Voltage	V _{oL}	GND	-	0.2V _{DD}	W	Digital input pins

4.5 LED Back Light Specification (12 White Chips)

Item	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	V _f	I _f =40mA	-	17.9	-	V
Uniformity (with L/G)	Δ B _p	I _f =40mA	75	80	-	%
Luminance for LCM	/	I _f =40mA	-	280	-	cd/m ²
Backlight Power Consumption	WBL	I _f =40mA	-	450	-	mW
Backlight Color	White					

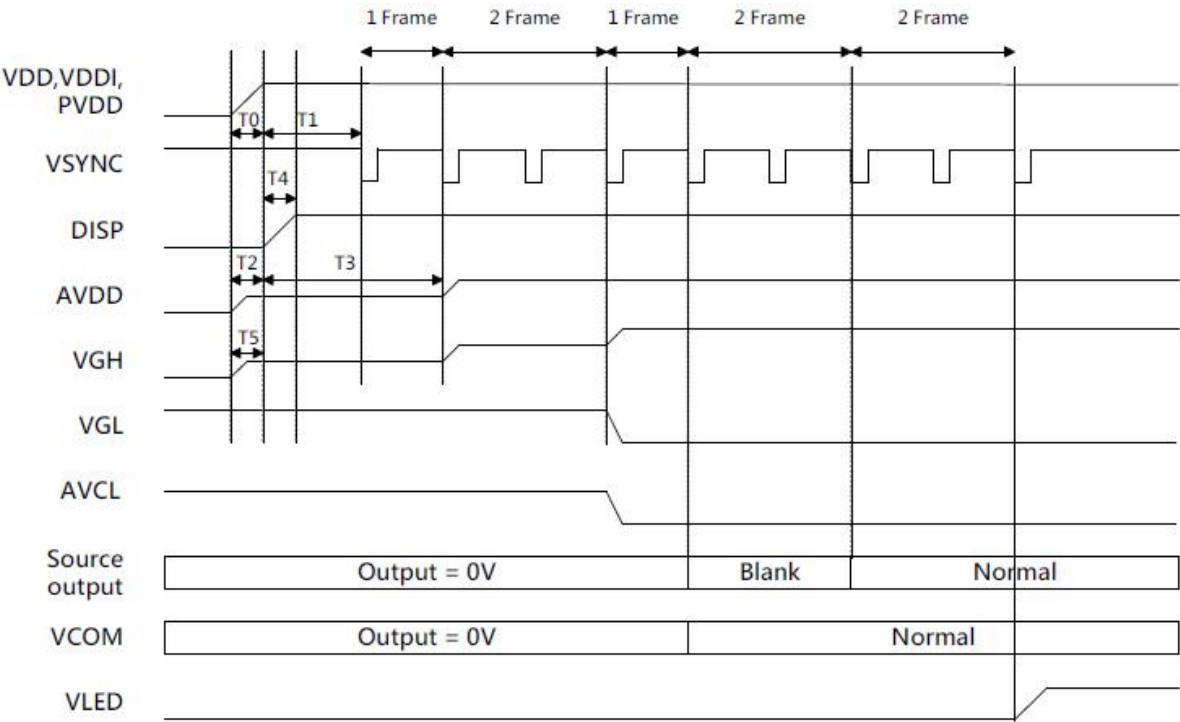
Note:LED Circuit

Backlight LED Circuit

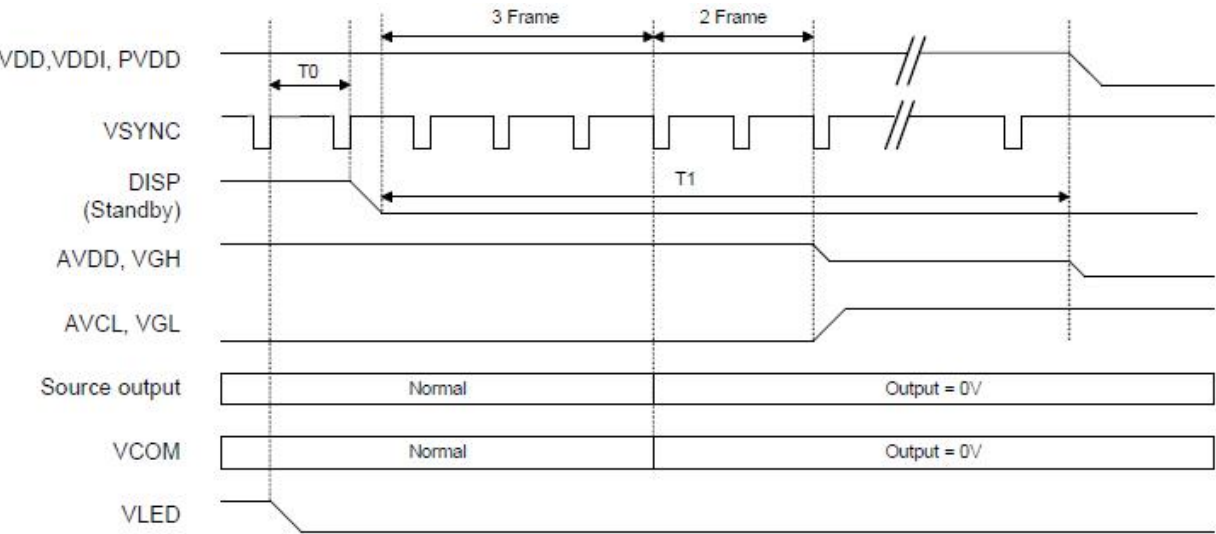


4.6 Power Sequence

Power on

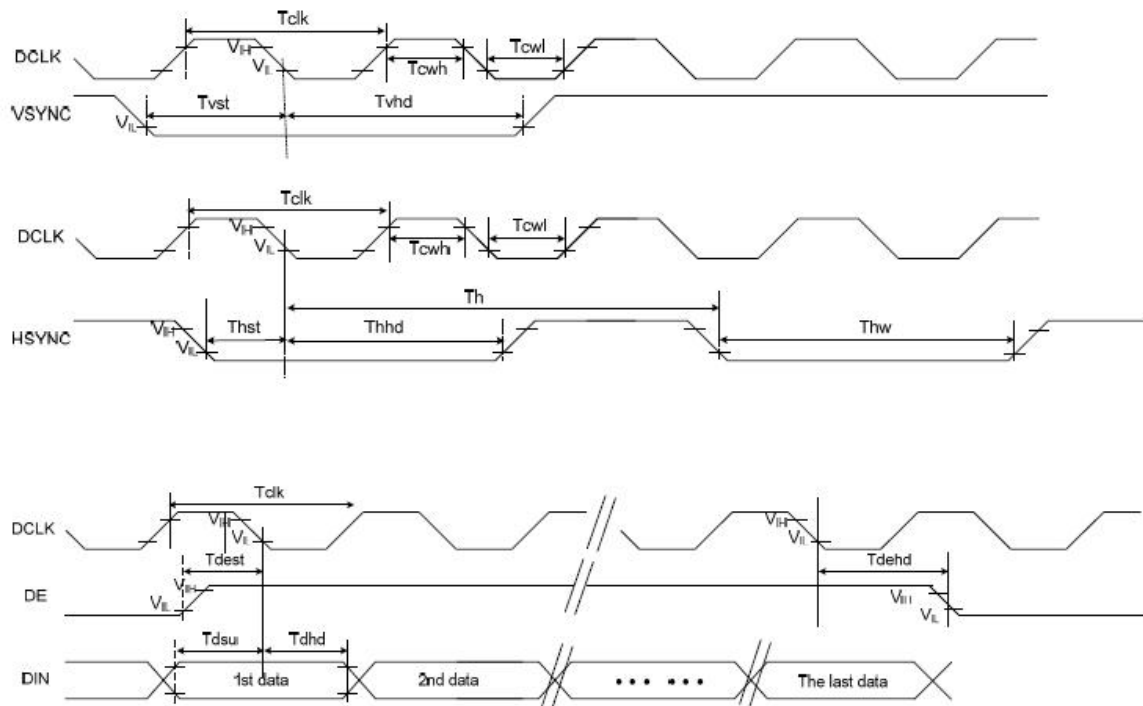


Power off

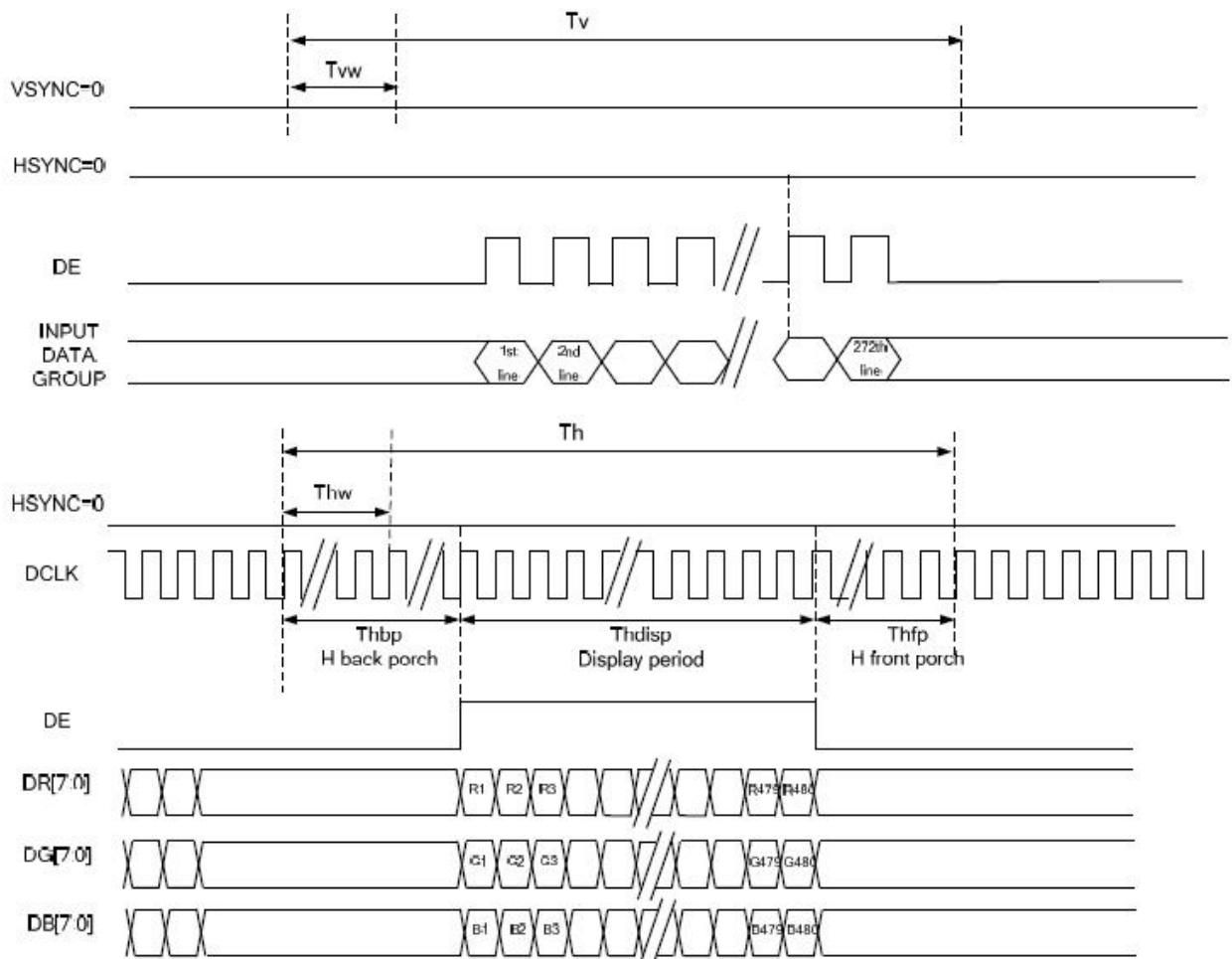


4.7 AC Timing Diagram

4.7.1 Clock and Data Input Timing Diagram



4.7.2 Display parallel RGB Interface Timing characteristics



4.7.3 Parallel 24-bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

Parallel 24-bit RGB Interface Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	TBD	TBD	TBD	MHz	
DCLK Period		Tclk	TBD	TBD	TBD	ns	
HSYNC	Period Time	Th	TBD	TBD	TBD	DCLK	
	Display Period	Thdisp	TBD	TBD	TBD	DCLK	
	Back Porch	Thbp	TBD	TBD	TBD	DCLK	
	Front Porch	Thfp	TBD	TBD	TBD	DCLK	
	Pulse Width	Thw	TBD	TBD	TBD	DCLK	
VSYNC	Period Time	Tv	TBD	TBD	TBD	HSYNC	
	Display Period	Tvdisp	TBD	TBD	TBD	HSYNC	
	Back Porch	Tvbp	TBD	TBD	TBD	HSYNC	
	Front Porch	Tvfp	TBD	TBD	TBD	HSYNC	
	Pulse Width	Tvw	TBD	TBD	TBD	HSYNC	

4.8 Optical specifications

<Table 4. Optical Specifications >

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°	1000	1500	-		Note2
Transmittance		Tr		3.78	4.45		%	Note3
Color Gamut		CG		55	60		%	
Reproduction of color	Red	Rx	Θ = 0°	0.618	0.638	0.658		Note4 (Based on C Light)
		Ry		0.318	0.338	0.358		
	Green	Gx		0.276	0.296	0.316		
		Gy		0.555	0.575	0.595		
	Blue	Bx		0.117	0.137	0.157		
		By		0.104	0.124	0.144		

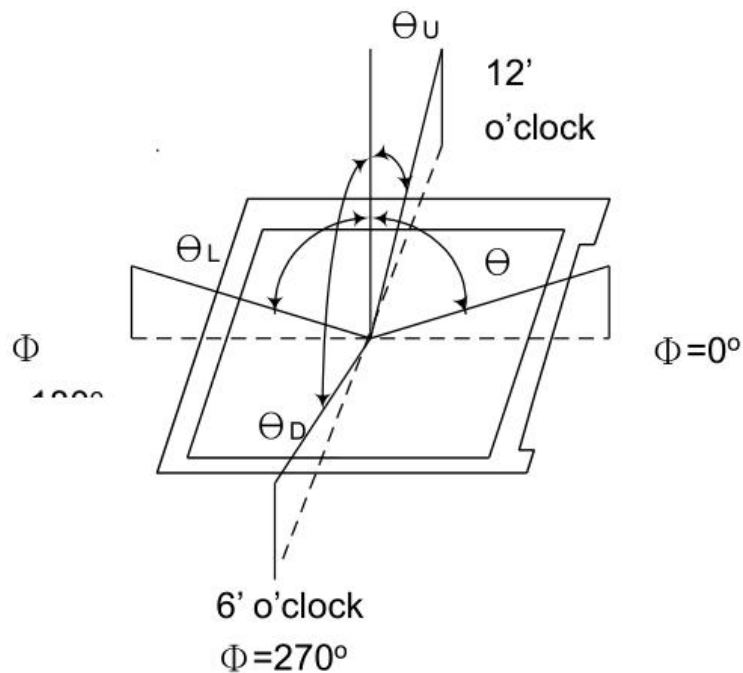
Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : $25 \pm 2^\circ\text{C}$
- 15min. warm-up time.

Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

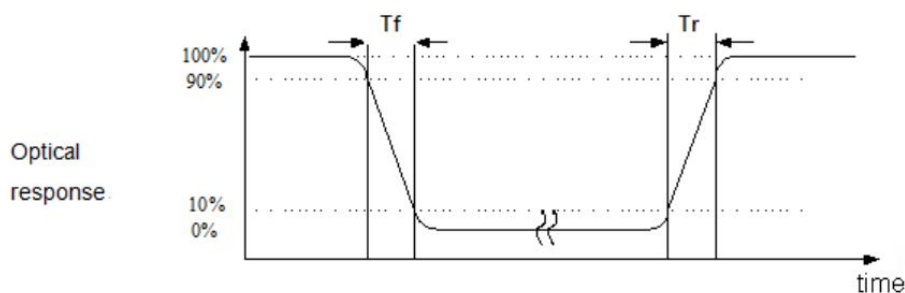
Note (1) Definition of Viewing Angle:



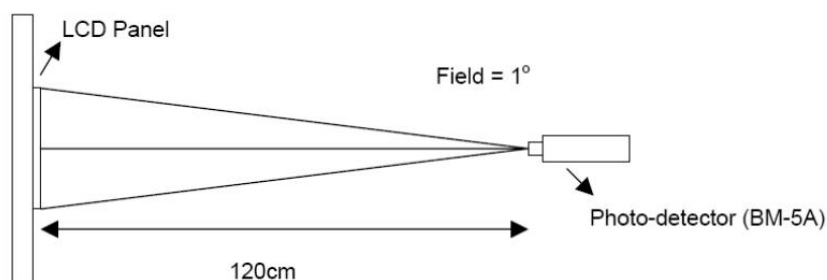
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



5. Reliability Test Conditions And Methods

Item	Test Conditions		Remark
High Temperature Storage	Ta = 70℃	96hrs	
Low Temperature Storage	Ta = -20℃	96hrs	
High Temperature Operation	Ts = 60℃	96hrs	
Low Temperature Operation	Ta = -10℃	96hrs	
Operate at High Temperature and Humidity	60℃, 90%RH max.	96hrs	Operation
Thermal Shock	-30℃~ +80℃ 10 cycles 1Hrs/cycle		Non-operation
Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5mm X,Y,Z direction for total 3hours (Packing Condition)		
Drooping Test	Drop to the ground from 1M height one time every side of carton. (Packing Condition)		
Electrostatic Discharge	Contact=±4KV, class B Air=±8KV, class B		

6. Handling Precautions

6.1 Mounting method

The LCD panel of FEXDA LCD module consists of two thin glass plates with polarizers which easily be damaged. And since the module is 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.

6.2 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 being contaminated:

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

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

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

6.3 Caution against static charge

The LCD module uses C-MOS LSI drivers, so we recommend 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.

6.4 packing

- Module employs LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity

6.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than the limit causes the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's become dark

color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.

- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

6.6 storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.

[It is recommended to store them as they have been contained in the inner container at the time of delivery from us

6.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

7. Precaution for use

7.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

7.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to FEXDA , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

8. Outline Dimension

