深圳市福瑞达显示技术有限公司

SPECIFICATION

Product Model: FRD500WQ03 (Rev.A)

Designed by	R&D Checked by	Quality Department by	Approved by

Approval by Customer

OK

NG，Problem survey:

Approved By _____

Revision Record

REV NO.	REV DATE	CONTENTS	Note
A	2013-01-12	NEW ISSUE	

Table Of Contents

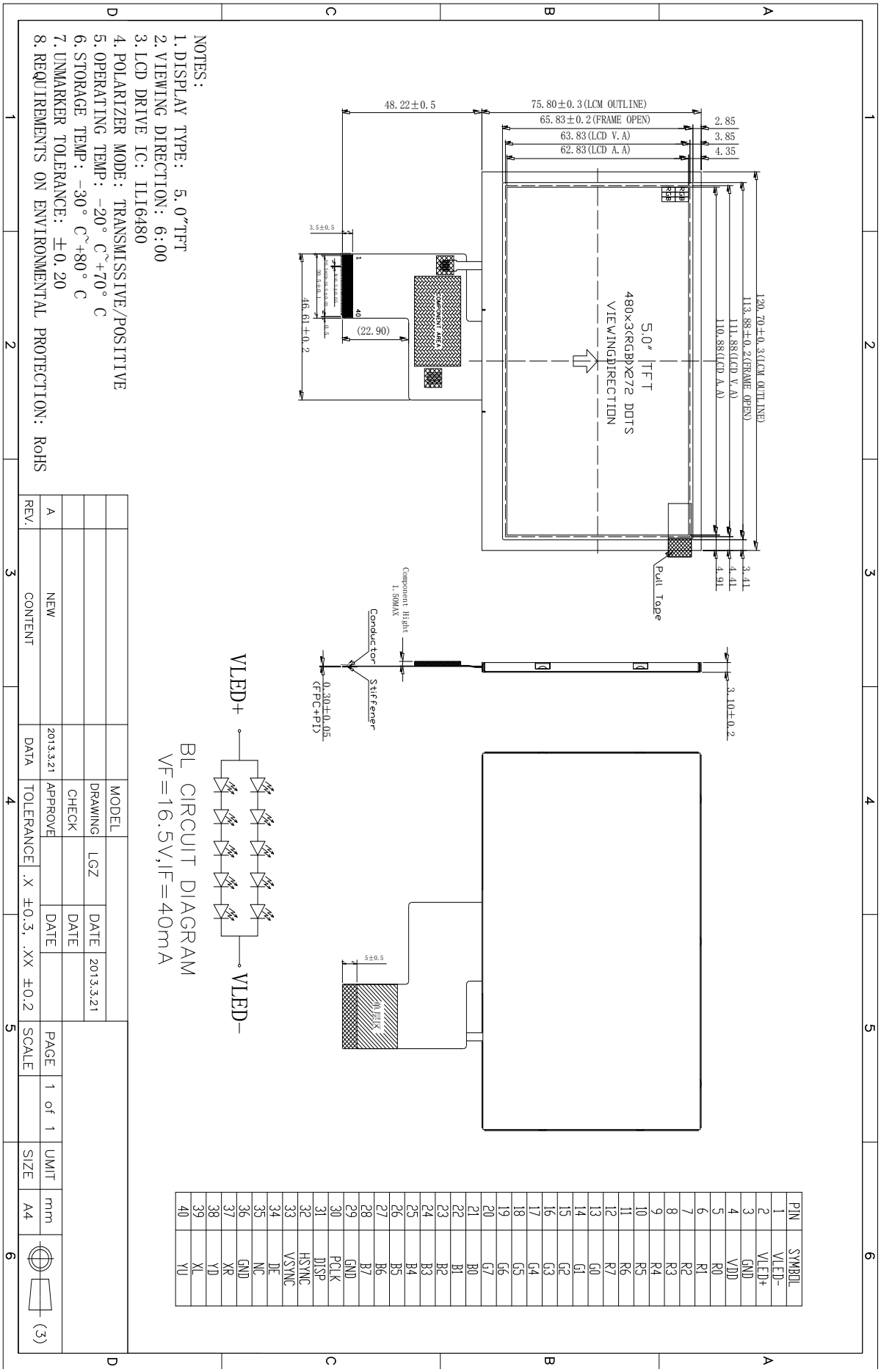
1. Numbering System

TBD

2. General Information

ITEM	STANDARD VALUES	UNITS
LCD type	5.0”TFT	--
Dot arrangement	480(RGB)×272	dots
Color filter array	RGB vertical stripe	--
Display mode	TN / Transmissive / Normally White	--
Viewing Direction	6 o’clock	--
Driver IC	ILI6480	--
Module size	120.7(W)×75.2(H)×3.1(T)	mm
Active area	110.88(W)×62.832(H)	mm
Dot pitch	0.231(W)×0. 231(H)	mm
Interface	24 bit RGB interface	
Operating temperature	-20 ~ +70	℃
Storage temperature	-30 ~ +80	℃
Back Light	10 White LED	--
Weight	TBD	g

3. External Dimensions



4. Interface Description

Pin	Symbol	Description.
1	VLED-	LED backlight (Cathode).
2	VLED+	LED backlight (Anode).
3	GND	Ground.
4	VDD	Power supply.
5~12	R0~R7	Red Data.
13~20	G0~G7	Green Data.
21~28	B0~B7	Blue Data.
29	GND	Ground.
30	PCLK	Dot clock signal input. Latching input data at its rising edge.
31	DISP	Display on/off.
32	HSYNC	Horizontal sync input. Negative polarity.
33	VSYNC	Vertical sync input. Negative polarity.
34	DE	Data enable input. Active high to enable the input data bus.
35	NC	NC.
36	GND	Ground.
37	XR	TP Right.
38	YD	TP Bottom.
39	XL	TP Left.
40	YU	TP Up.

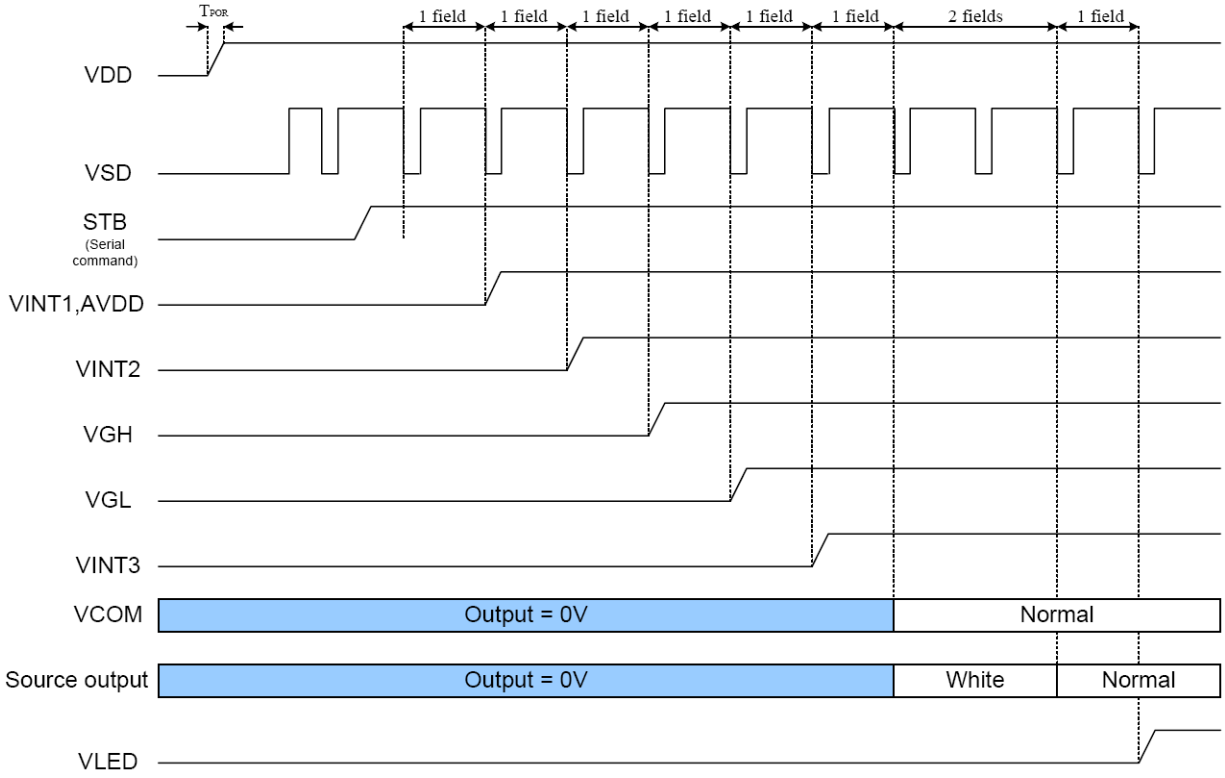
5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Analog Supply Voltage	VDD	-0.3	5	V
Input Voltage	Vin	-0.3	VDD+0.3	V
Operating Temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	°C
Storage Humidity	HD	20	90	%RH

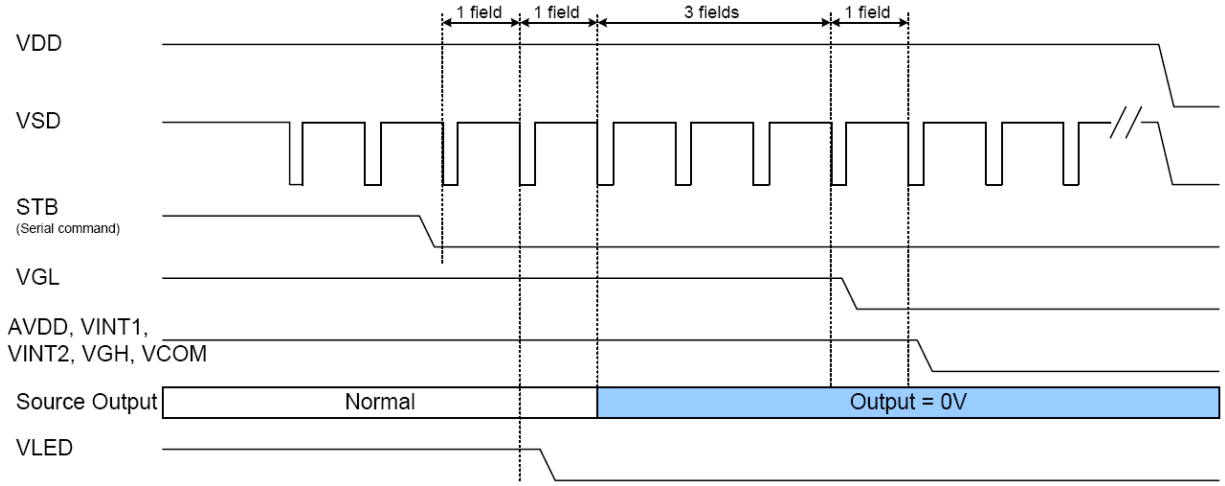
6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Analog Supply Voltage	VDD	3.0	3.3	3.6	V	-
Input High Voltage	V_{IH}	0.7VDD	-	VDD	V	Digital input pins
Input Low Voltage	V_{IL}	GND	-	0.3VDD	V	Digital input pins
Output High Voltage	V_{OH}	VDD-0.4	-	VDD	V	Digital output pins
Output Low Voltage	V_{OL}	GND	-	VDD+0.4	V	Digital output pins
I/O Leak Current	I_{LI}	-1	-	1	uA	-

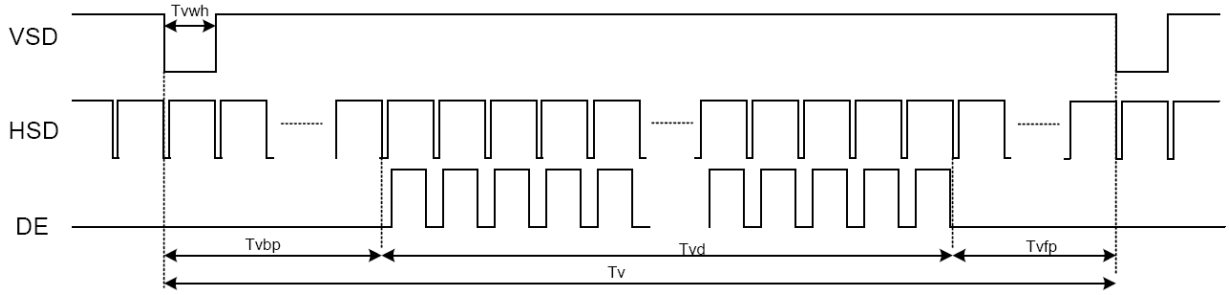
7. Timing Characteristics
7.1 Power ON/OFF Sequence
Power ON Sequence



Power OFF Sequence

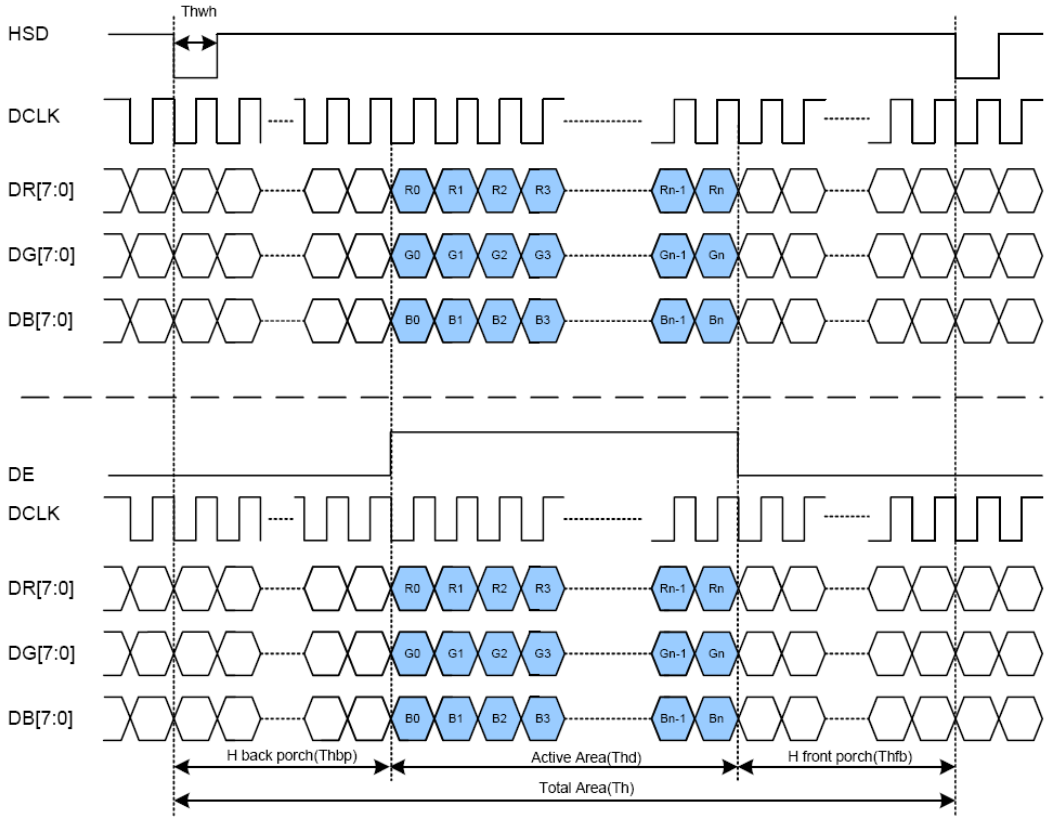


7.2 Data Input Format
7.2.1 Vertical input timing



7.2.2 Parallel RGB Mode Data format

(HV Mode)

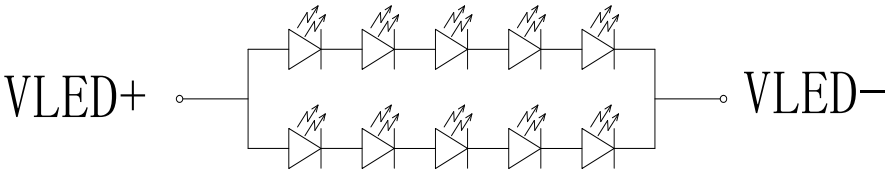


(DE Mode)

7.2.3 Parallel RGB input timing table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	5	9	12	MHz
VSD period time	Tv	277	288	400	H
VSD display area	Tvd		272		H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	93	H
HSD period time	Th	520	525	800	DCLK
HSD display area	Thd		480		DCLK
HSD back porch	Thbp	36	40	255	DCLK
HSD front porch	Thfp	4	5	65	DCLK

8. Backlight Charasterics



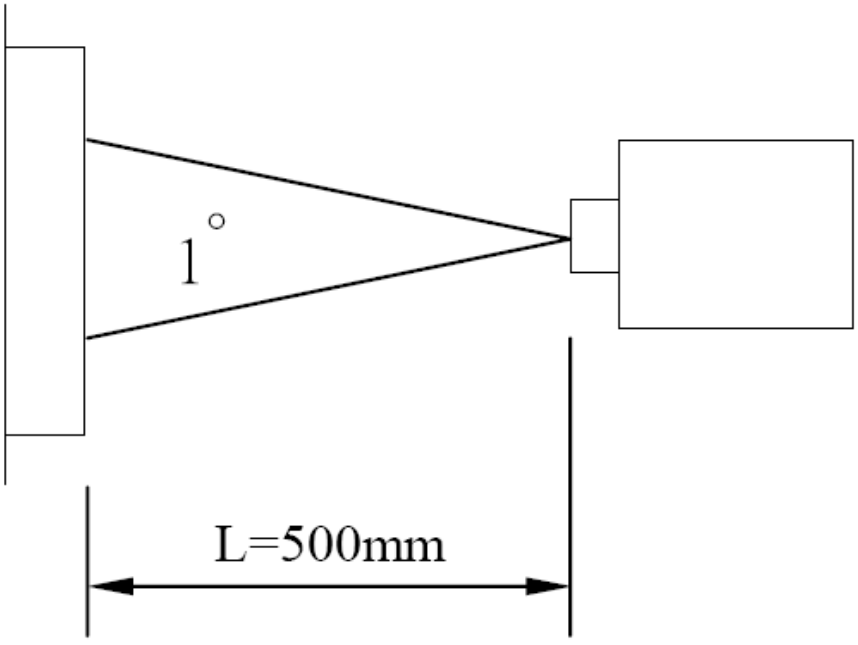
Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	15.0	16.5	17.5	V	If=40mA
Supply Current	If	-	40	50	mA	-
Luminous Intensity for LCM	-	310	370	-	Cd/m^2	If=40mA
Uniformity for LCM	-	80	-	-	%	If=40mA
Life Time	-	50000	-	-	Hr	If=40mA
Backlight Color	White					

9. Optical Characteristics

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Transmittance		T		5.6	6.3		%	
Contrast Ratio		CR	*1)	350	500	-	--	Note 3
Response Time		Tr+ Tf	*3)	-	30		ms	Note 4
Viewing Angle	U	θ*2)	CR≧10	45	55	-		Note 5
	D			55	65	-		
	L	ψ*2)		55	65	-		
	R			55	65	-		
Color Filter Chromacicity	White	x	θ=ϕ= 0°	0.285	0.305	0.325		Note 6
		y		0.314	0.334	0.354		
		Y		29.9	32.9	35.9		
	Red	x	θ=ϕ= 0°	0.588	0.608	0.628		
		y		0.296	0.316	0.336		
		Y		17.8	20.8	23.8		
	Green	x	θ=ϕ= 0°	0.285	0.305	0.325		
		y		0.536	0.556	0.576		
		Y		57.6	61.6	65.6		
	Blue	x	θ=ϕ= 0°	0.115	0.135	0.155		
		y		0.117	0.137	0.157		
		Y		13.2	16.2	19.2		
	NTSC		-	-	53%	-		

Note 1.Ambient condition：25℃±2℃，60±10%RH，under 10 Lunx in the darkroom。

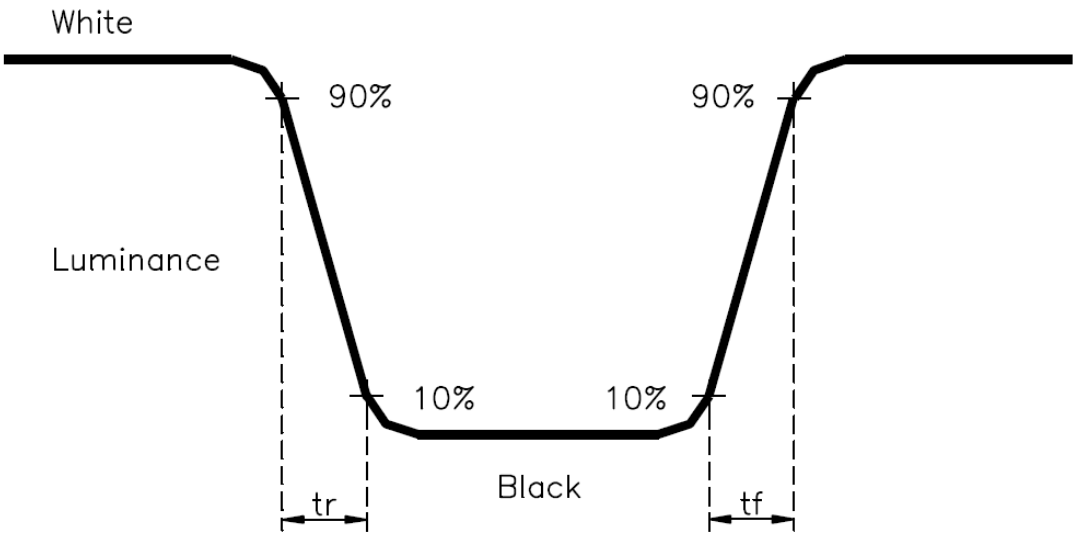
Note 2.Measure device：BM-5A (TOPCON)，viewing cone= 1 °，IL=20mA。



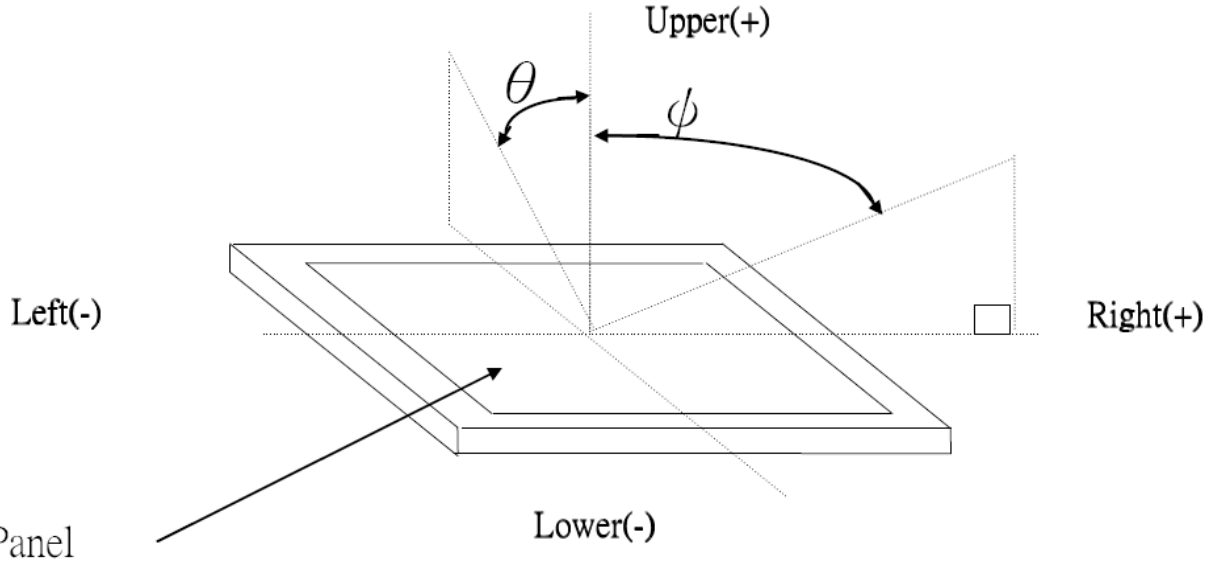
Note 3. Definition of Contrast Ratio：

CR = White Luminance (ON) / Black Luminance (OFF)

Note 4. Definition of response time：The response time is defined as the time interval between the 10% and 90% amplitudes.



Note 5. Definition of view angle(θ，ψ)：



Note 6. Light source: C light.

10. Reliability Test Conditions And Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80℃±2℃×200Hours	Inspection after 2~4hours storage at room temperature,the samples should be free from defects: 1,Air bublle in the LCD. 2,Sealleak. 3,Non-display. 4,Missing segments. 5,Glass crack. 6,Current IDD is twice higher than initial value. 7,The surface shall be free from damage. 8,The electric charateristic requirements shall be satisfied.
②	Low Temperature Storage	-30℃±2℃×200Hours	
③	High Temperature Operating	70℃±2℃×120Hours	
④	Low Temperature Operating	-20℃±2℃×120Hours	
⑤	Temperature Cycle(Storage)	-20℃ ⟺ 25℃ ⟺ 70℃ (30min) (5min) (30min) 1cycle Total 10cycle	
⑥	Damp Proof Test (Storage)	50℃±5℃×90%RH×120Hours	
⑦	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5M X,Y,Z direction for total 3hours (Packing Condition)	
⑧	Drooping Test	Drop to the ground from 1M height one time every side of carton. (Packing Condition)	
⑨	ESD Test	Voltage:±8KV,R:330Ω,C:150PF,Air Mode,10times	

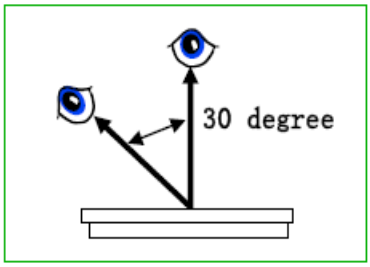
REMARK:
1,The Test samples should be applied to only one test item.
2,Sample side for each test item is 5~10pcs.
3,For Damp Proof Test,Pure water(Resistance＞10MΩ)should be used.
4,In case of malfunction defect caused by ESD damage,if it would be recovered to normal state after resetting,it would be judge as a good part.
5,EL evaluation should be excepted from reliability test with humidity and temperature:Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
6,Failure Judgment Criterion:Basic Specification Electrical Characteristic,Mechanical Characteristic,Optical Characteristic.

11. Inspection Standard

This standard apply to TFT module specification.

1. Inspection condition:

Under daylight lamp 20~40W, product distance inspector'eye 30cm,incline degree 30° 。



2. Inspection standard

<table>
<tr><th>NO.</th><th>Item</th><th>Inspection standard</th><th>Rate</th></tr>
<tr><td>2.1</td><td>Dot</td><td>Case of Dot defect is below
① Bright Dot (whit spot) : “0”
② Dark Dot (black spot) : “0” (In case of Dark Dot on Main TFT LCD)
- NG if there's full Dot defect.
- Damaged less than the size of sub-pixel is not counted as defect
- Dots darker than the size of sub-pixel are not defined as bright dot defect
<table>
<tr><th>area
size（mm）</th><th>Acceptable number</th></tr>
<tr><td>Φ≤0.10</td><td>ignore</td></tr>
<tr><td>0.10＜Φ≤0.15</td><td>3</td></tr>
<tr><td>0.15＜Φ≤0.20</td><td>2</td></tr>
<tr><td>0.25＜Φ≤0.25</td><td>1</td></tr>
<tr><td>0.25＜Φ</td><td>0</td></tr>
</table></td><td rowspan="2">minor</td></tr>
<tr><td>2.2</td><td>line</td><td>
<table>
<tr><th colspan="2">Size（mm）</th><th>Acceptable number</th></tr>
<tr><td>ignore</td><td>W≤0.03</td><td>ignore</td></tr>
<tr><td>L≤4.0</td><td>0.03＜W≤0.04</td><td>2</td></tr>
<tr><td>L≤4.0</td><td>0.04＜W≤0.05</td><td>1</td></tr>
<tr><td></td><td>0.05＜W</td><td>Treat with dot non-conformance</td></tr>
</table></td></tr>
</table>

12. Handling Precautions

12.1 Mounting method

The LCD panel of SC 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.

12.2 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) , 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 (CI), Salfur (S) from customer, Responsibility is on customer.

12.3 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.

12.4 packing

- Module employ 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 direct to sunshine or high temperature/humidity

12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause 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 then the operating temperature range and on the other hand at higher temperature LCD's how 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.

12.6 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

12.7 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

13. Precaution For Use

13.1

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.

13.2

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 FRIDA LCD , 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.

14. Packing Method

TBD