

SPECIFICATION

Customer Part Number: ...

Tianma Part Number: TM084SDHG01-02

Product Description: 8.4" 800xRGBx600 TFT-LCD Module

[] Target Specification
[☒] Preliminary Specification
[] Final Specification

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* This cover page is for your Comments and Signatures back to TIANMA.

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1.Summary

1.1 Summary

This is a 8.4 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module with Normally White technology. This product is designed for industrial applications.

1.2 Features

- DC-DC power/LED driver circuit is embedded
- 50Khrs LED life time
- LVDS interface(6/8 bit selectable)
- With PCB
- Anti- glare surface treatment
- Compliant with the European RoHS Directive (2011/65/EU) and Delegated Directive (2015/863/EU, Amending Annex II of 2011/65/EU)

2 General Specifications

Feature		Spec
Display Spec.	Size	8.4 inch
	Resolution	800(RGB) x 600
	Pixel pitch(mm)	0.213×0.213
	Technology Type	a-Si TFT
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	TN, Normally White
	Surface Treatment	Anti Glare
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)	203x 142.5 x 5.7
	Active Area(mm)	170.4 (W) X127.8(H)
	Weight (g)	185.1
	Matching Connection Type(CN1)	DF19-20S-1C(HRS)
	Matching Connection Type(CN2)	H208K-P04N-02B (Entery)
Optics	Luminance	Typ 350 cd/m2
	Contrast ratio	Typ 500
	NTSC	Typ 50%
	Viewing angle	At the contrast ratio ≥10:1 • Horizontal: Right side 70° (typ.), Left side 70° (typ.) • Vertical: Up side 60° (typ.), Down side 70° (typ.)
Electrical Characteristics	Interface	LVDS 6/8 bit
	Color Depth	262K/16.7M
	Power consumption	LCD:515mW ; Backlight:1. 52W
	Power supply voltage	LCD panel: 3.3V Typ. LED Driver: 12V Typ.

Table 2.1 General TFT Specifications

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: LCM weight tolerance: +/- 5%

3 Input/Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector: DF19K-20P-1H (54) (HRS)

Matching Connector: DF19-20S-1C(HRS)

Pin	Symbol	I/O	Description	Remark
1	VDD	P	Power supply	
2	VDD	P	Power supply	
3	UD	I	Vertical Reverse Scan Control	Note1
4	LR	I	Horizontal Reverse Scan Control	Note1
5	RxIN1-	I	Negative data 1 for LVDS signal input	
6	RxIN1+	I	Positive data 1 for LVDS signal input	
7	GND	P	Ground	
8	RxIN2-	I	Negative data 2 for LVDS signal input	
9	RxIN2+	I	Positive data 2 for LVDS signal input	
10	GND	P	Ground	
11	RxIN3-	I	Negative data 3 for LVDS signal input	
12	RxIN3+	I	Positive data 3 for LVDS signal input	
13	GND	P	Ground	
14	RxCLKIN-	I	negative clock for LVDS signal input	
15	RxCLKIN+	I	Positive clock for LVDS signal input	
16	GND	P	Ground	
17	SEL68	I	LVDS 6/8 bit selection control Hight:8bit;Low or NC:6bit	
18	NC	-	No connection	
19	RxIN4-	I	Negative data 4 for LVDS signal input	
20	RxIN4+	I	Positive data 4 for LVDS signal input	

Table 3.1 terminal pin assignments

I---Input, O---Output, P--- Power/Ground

Note1: All of the GND pins should be connected to the system ground.

Note1: Scanning direction description
IC is in 6 o'clock direction.

Scan control input		Scanning direction
UD	LR	
HIGH	HIGH	Down to up, left to right
LOW	LOW	Up to down, right to left
HIGH	LOW	Down to up, right to left
LOW	HIGH	Up to down, left to right

3.2 CN2 pin assignment (Backlight interface)

Connector type: 3808K-F04N-03R (Entery)
Matching Connector type: H208K-P04N-02B (Entery)

Pin	Symbol	I/O	Description	Remark
1	VBL	P	Backlight Power supply , 12V input	
2	PGND	P	Ground	
3	BL_EN	I	Enable : 3.3V for backlight on ; 0V for backlight off	
4	Dimming	I	Adjust the luminance of LED's	

4 Absolute Maximum Ratings

GND=0V

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VDD	0	5.0	V	
	VBL	-0.3	24	V	
Input voltage	V _{IN}	-0.3	5.0	V	Note1
Operating Temperature	Top	-20	70	°C	
Storage Temperature	Tst	-30	80	°C	
Relative Humidity (Note2)	RH	--	≤95	%	Ta≤40°C
		--	≤85	%	40°C < Ta≤50°C
		--	≤55	%	50°C < Ta≤60°C
		--	≤36	%	60°C < Ta≤70°C
		--	≤24	%	70°C < Ta≤80°C
Absolute Humidity	AH	--	≤70	g/m ³	Ta>70°C

Table 3 Absolute Maximum Ratings

Note1: Input voltage include RxIN+/ RxIN-, RxCLKIN+/ RxCLKIN-, SEL68, UD, LR, BL_EN, Dimming.

Note2: Ta means the ambient temperature.

It is necessary to limit the relative humidity to the specified temperature range.

Condensation on the module is not allowed.

Note3: The absolute maximum rating values of this product are not allowed to be exceeded at any times.

When exceeded the maximum ratings, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed.

5 Electrical Characteristics

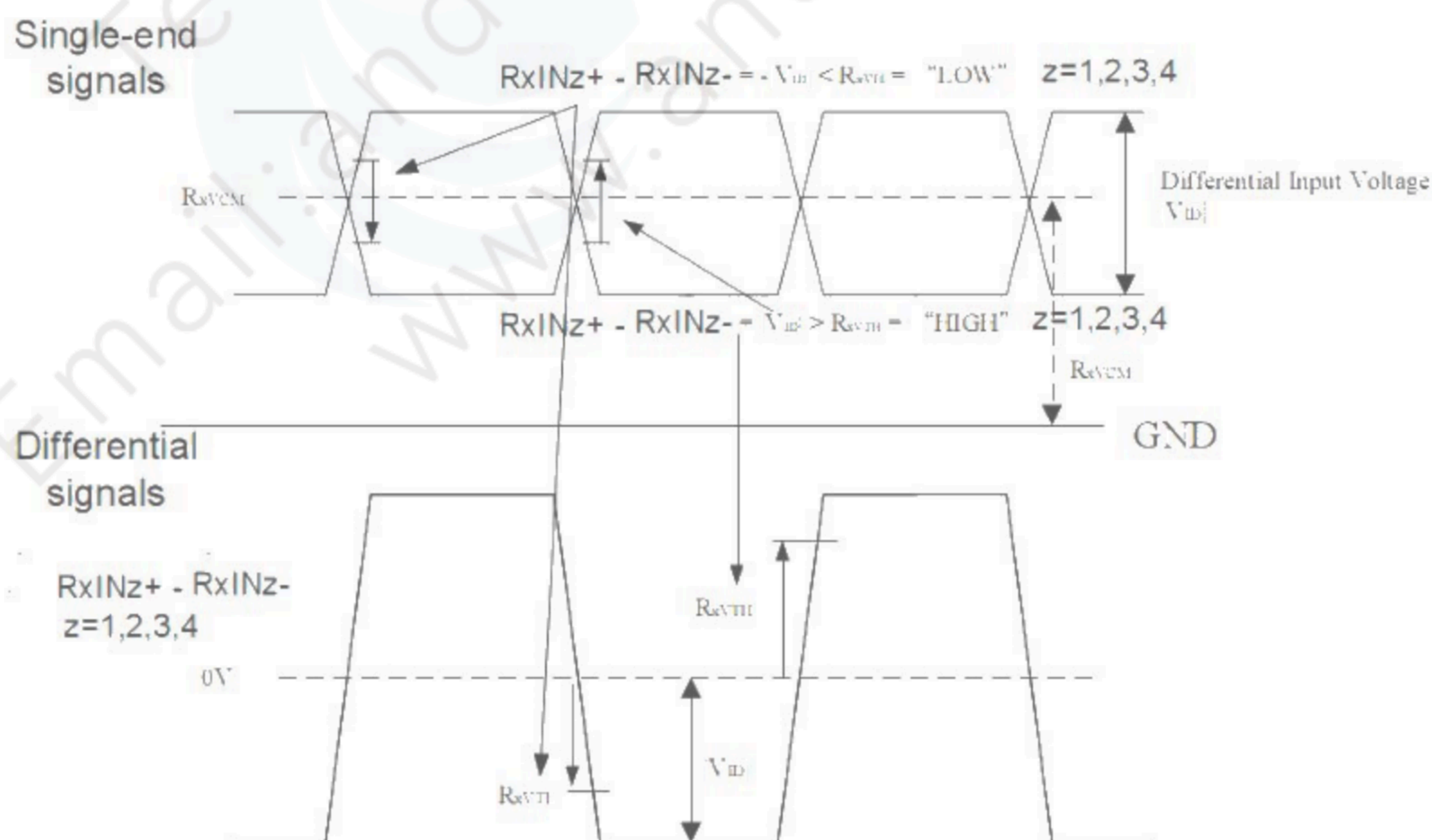
5.1 DC Characteristics for Panel Driving

VDD=3.3V, GND=0V, Ta = 25°C

Item	Symbol	Min	Typ	Max	Unit	Remark
POWER Supply Voltage	VDD	3.0	3.3	3.6	V	
Differential input high threshold voltage	RxVTH			+0.2	V	RxVCM = 1.2V
Differential input low threshold voltage	RxVTL	-0.2			V	
Input voltage range (singled-end)	RxVIN	0		VDD-1.2	V	
Differential input common mode voltage	RxVCM	VID /2		VDD-1.2- VID /2	V	
Differential input voltage	VID	0.2		0.6	V	
Current of VDD Power supply	Ivdd	-	156	234	mA	Note1
Power consumption of VDD	Wvdd	-	515	-	mW	
Inrush current of VDD	Irush	-	0.6	-	A	

Table 5.1 LCD module electrical characteristics

Note1: To test the current dissipation, use "all Black Pattern".



5.2 DC Characteristics for Backlight Driving

GND=0V, Ta = 25°C

Item		Symbol	Min	Typ	Max	Unit	Remark
Voltage of LED driver circuit		VBL	11.5	12	12.5	V	
Current of LED driver circuit		IBL	-	127	191	mA	
Power Consumption		W _{BL}	-	1524	-	mW	
Dimming Signal frequency		Fdimming	0.1		100	KHz	
Dimming Signal duty	100Hz~10KHz	-	1	-	100	%	
	10KHz~100KHz	-	10	-	100	%	
LED Life time		-	--	(50000)	--	H	

Table 5.2 LED backlight characteristics

Note 1: If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data

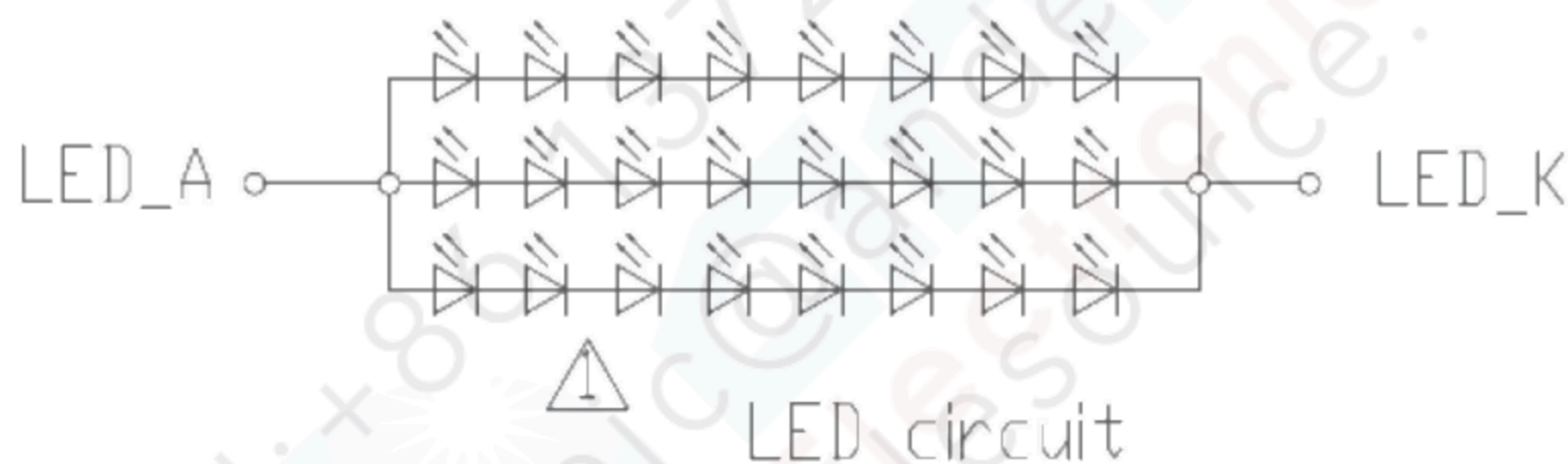
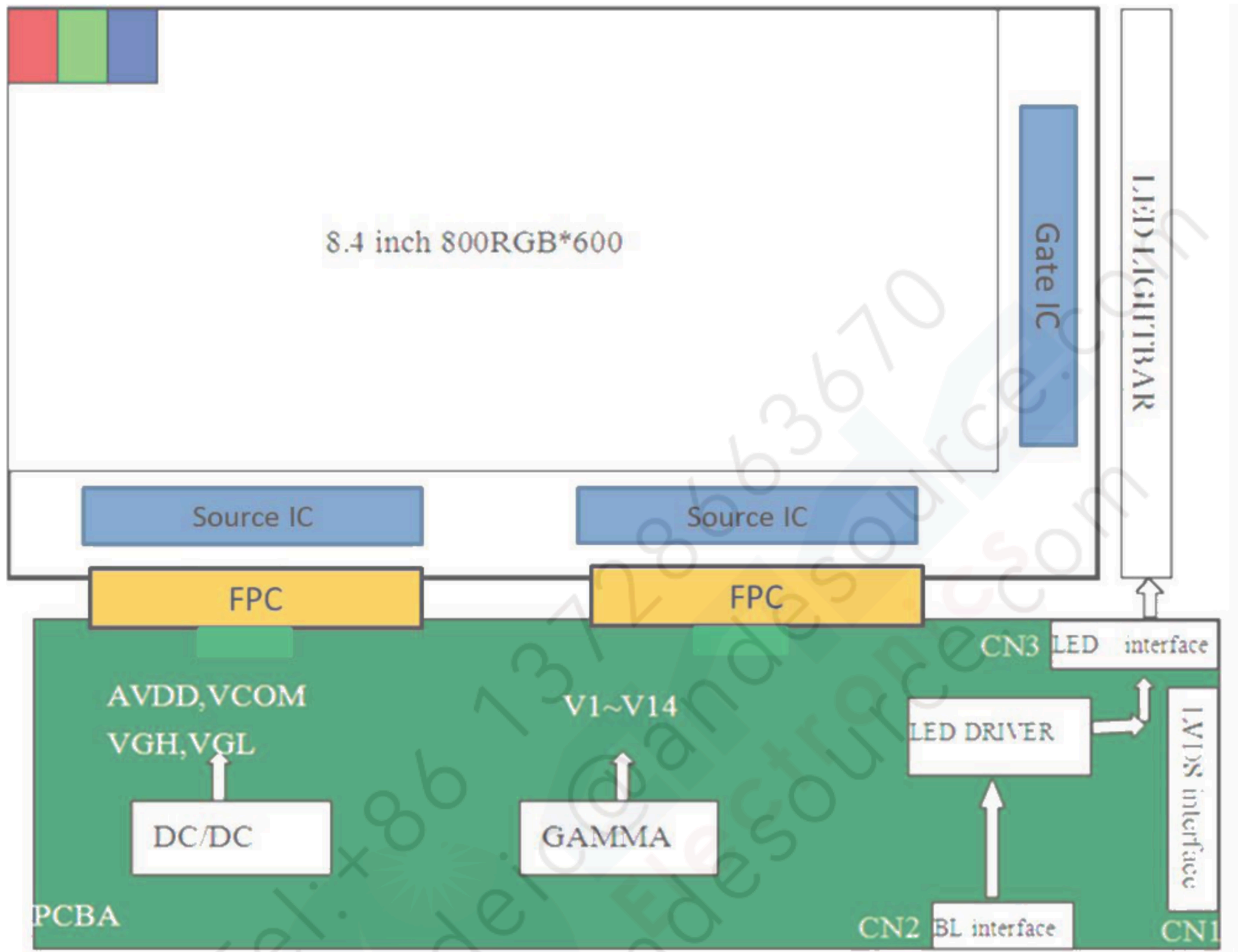


Figure5.2 LED connection of backlight

5.3 LCD Module Block Diagram



6 Interface Timing Chart

6.1 Timing characteristics

VDD=3.3V, GND=0V, Ta=25°C

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	Fclk	32.6	39.6	62.4	MHz	Tclk=1/Fclk
	Tclk	30.7	25.3	16.03	ns	
HSYNC	TH	890	1000	1300	Tclk	
	THD	800			Tclk	
	thb+thfp	90	200	500	Tclk	
VSYNC	TV	610	660	800	TH	
	TVD	600			TH	
	Tvwh	10	60	200	TH	

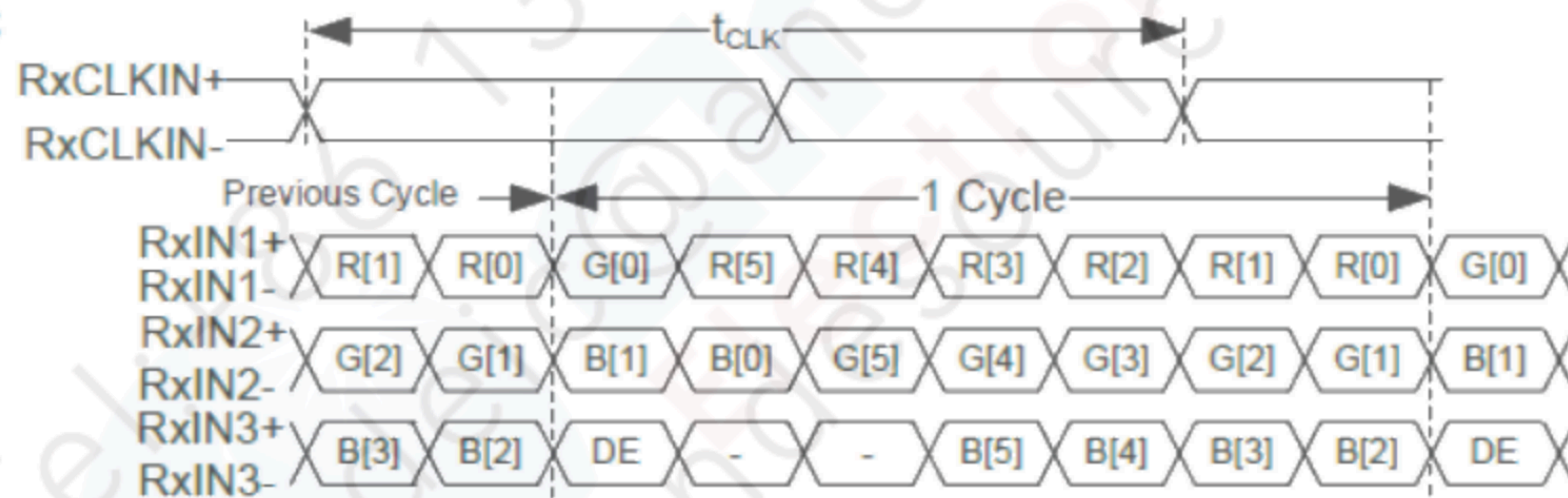
Table 6.1 Timing characteristics

6.2 LVDS Input Data Format

DE mode

6-bit LVDS input

SEL68=low or NC



8-bit LVDS input

SEL68= high

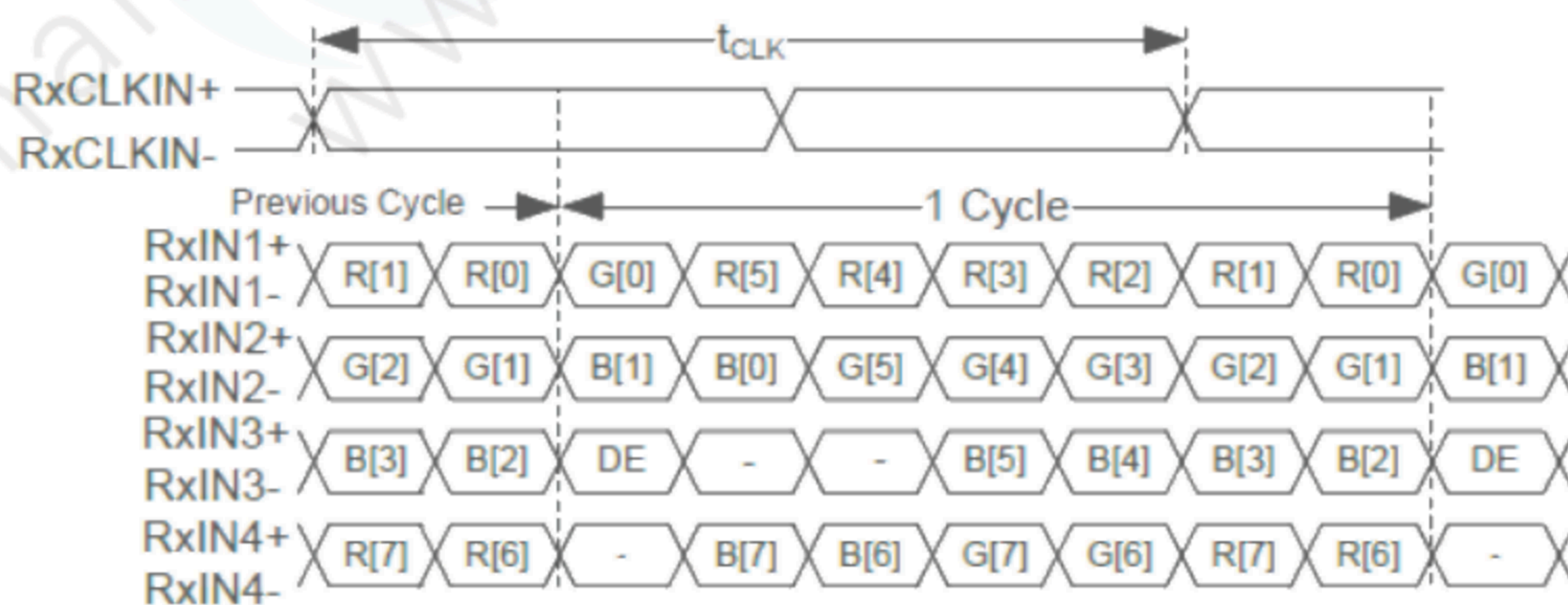


Figure6.2 LVDS input data mapping(VESA)

6.3 Input signal AC timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Clock frequency	RxFCLK	20	-	71	MHz	
Clock high time	TLVCH		$4/(7 * RxFCLK)$		nS	
Clock low time	TLVCL		$3/(7 * RxFCLK)$		nS	

Table 5.3 LVDS clock Input timing

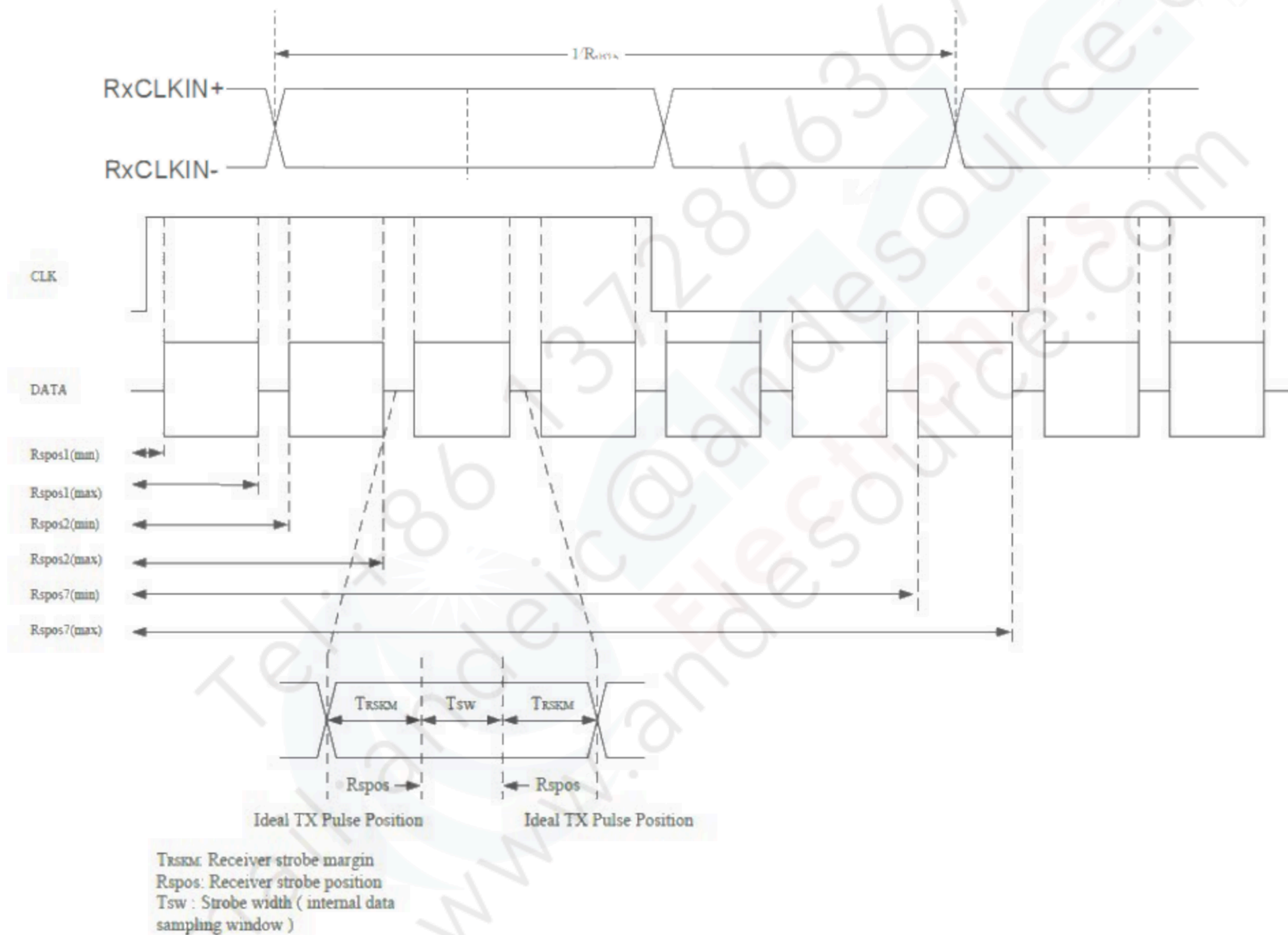


Figure5.2 Input signal AC timing

6.4 POWER ON/OFF SEQUENCE

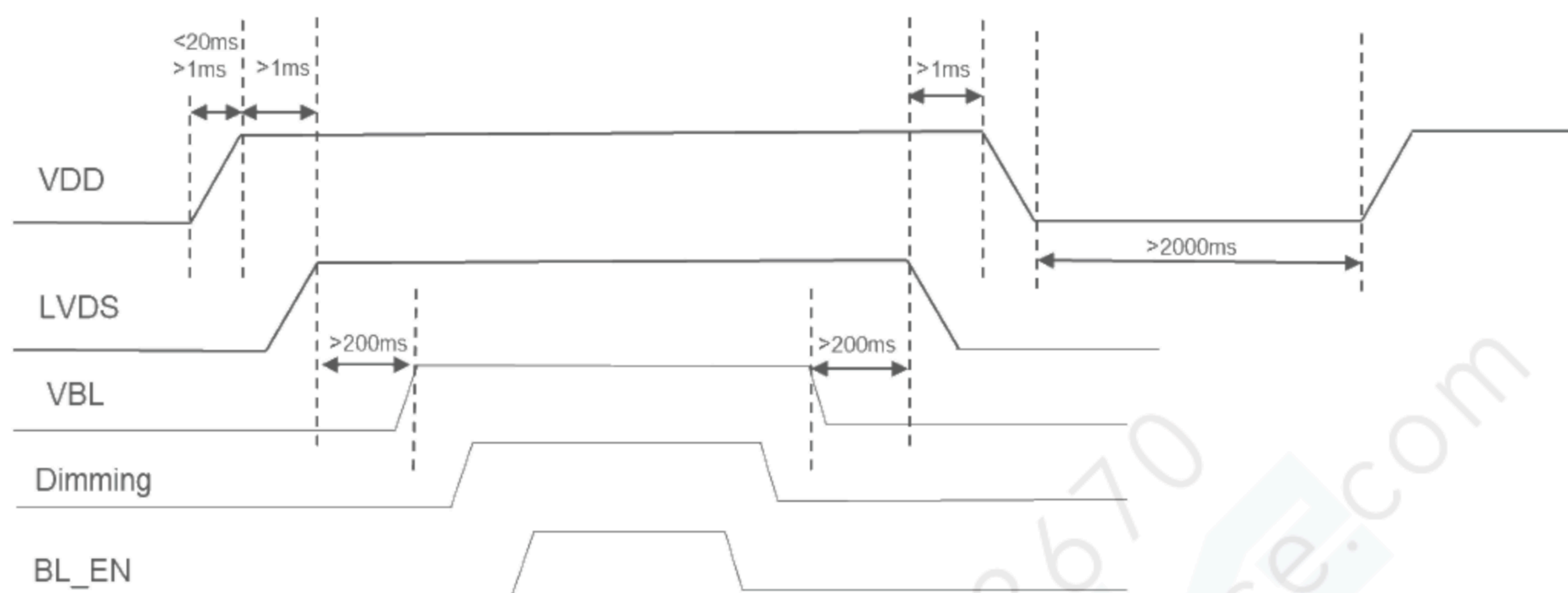


Figure6.4 Interface power on/off sequence

7 Optical Characteristics

Ta=25℃

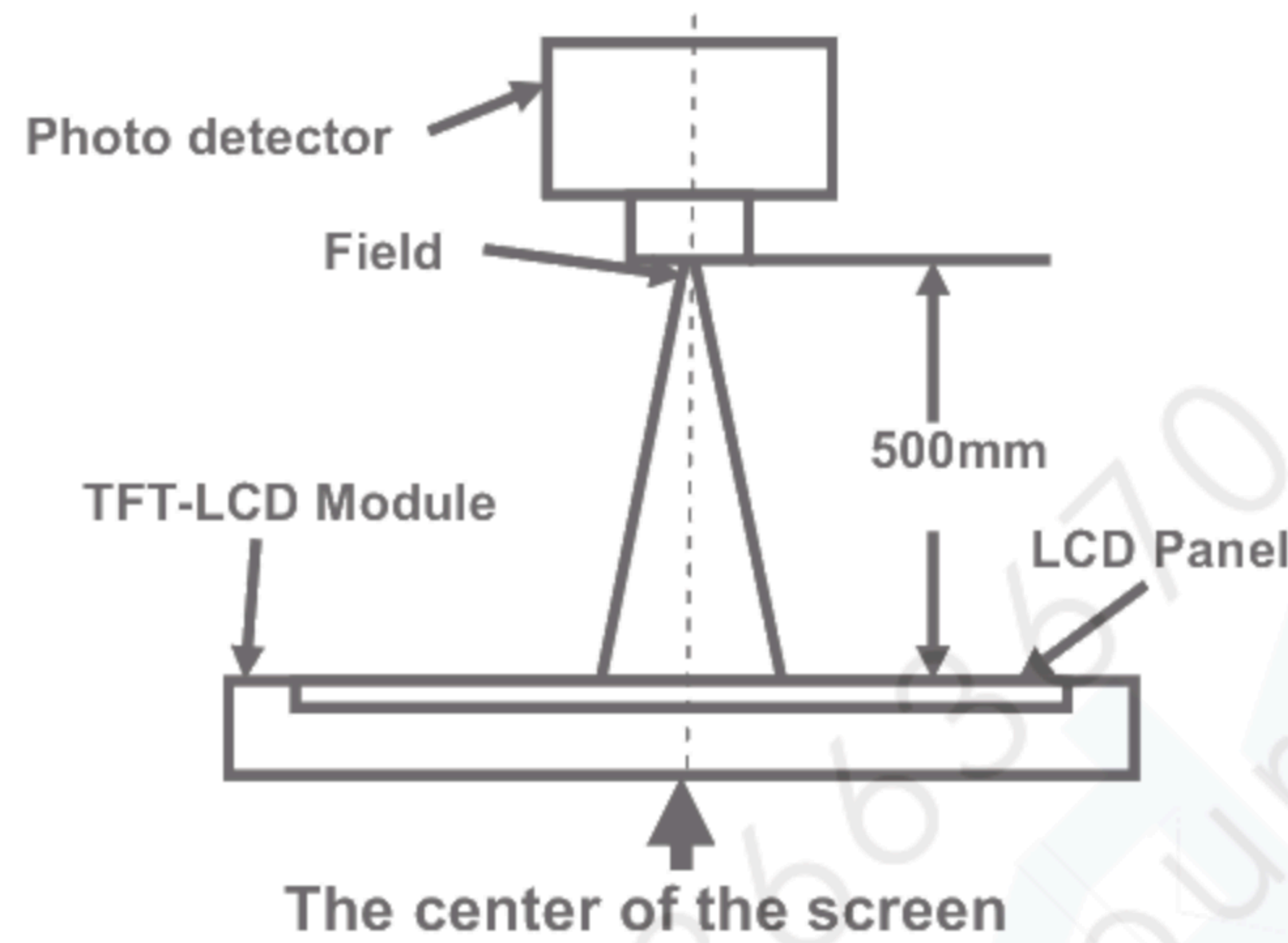
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR ≥ 10	50	60	-	Degree	Note 2
		θB		60	70	-		
		θL		60	70	-		
		θR		60	70	-		
Contrast Ratio		CR	θ=0°	400	500	-		Note1 Note3
Response Time		T _{ON}	25℃	-	20	30	ms	Note1 Note4
		T _{OFF}						
Chromaticity	White	x	Backlight is on	0.25	0.300	0.35		Note1 Note5
		y		0.281	0.331	0.381		
	Red	x		0.546	0.596	0.646		
		y		0.281	0.331	0.381		
	Green	x		0.296	0.346	0.396		
		y		0.539	0.589	0.639		
	Blue	x		0.103	0.153	0.203		
		y		0.054	0.104	0.154		
Uniformity		U		70	75	-	%	Note1 Note6
NTSC				45	50	-	%	Note 5
Luminance		L		280	350	-	cd/m ²	Note1 Note7

Test Conditions:

1. $I_F = 160 \text{ mA}$, $V_F = 9.6 \text{ V}$ and the ambient temperature is $25 \pm 2^\circ\text{C}$. humidity is $65 \pm 7\%$
2. The test systems refer to Note 1 and Note 2.

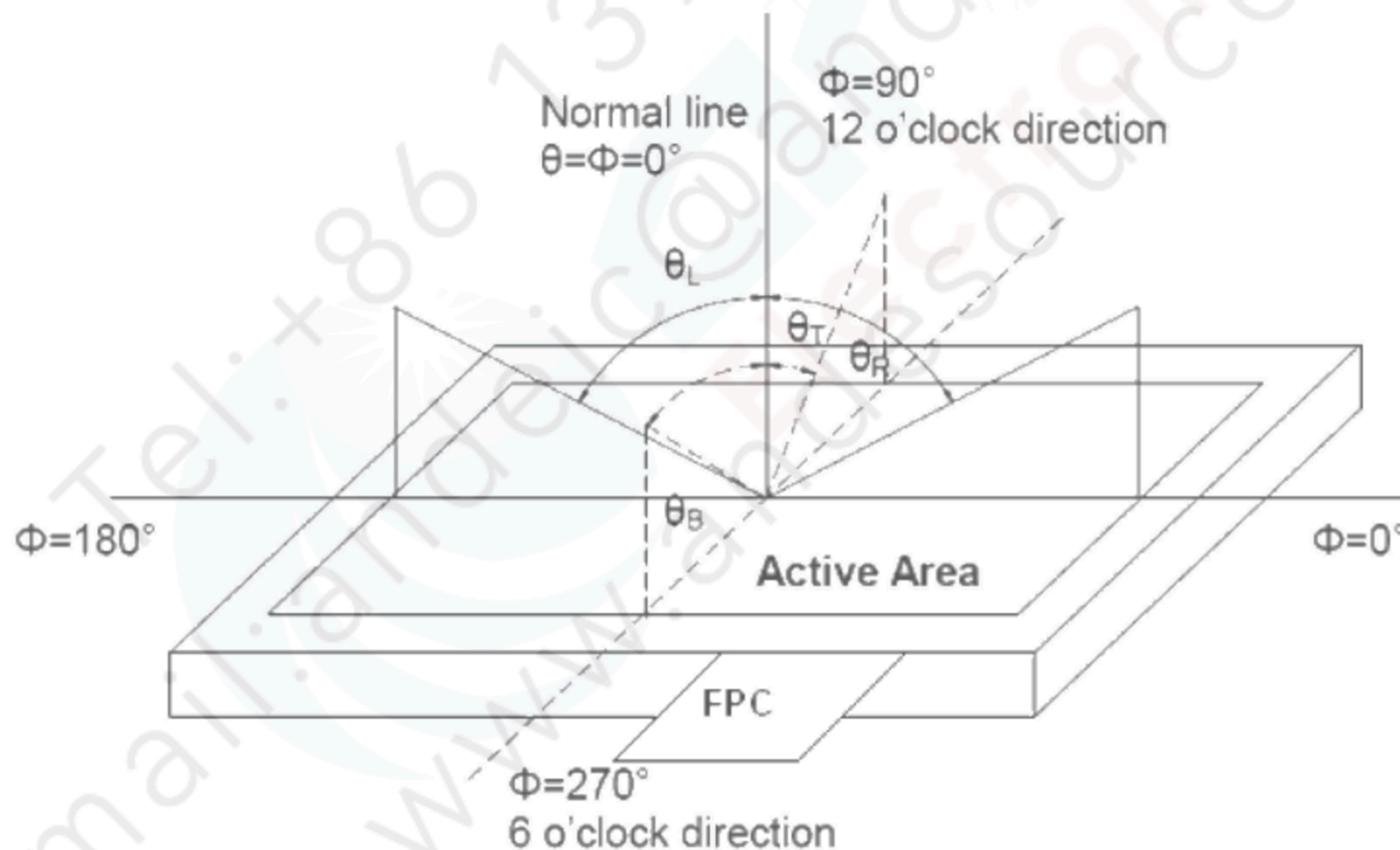
Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

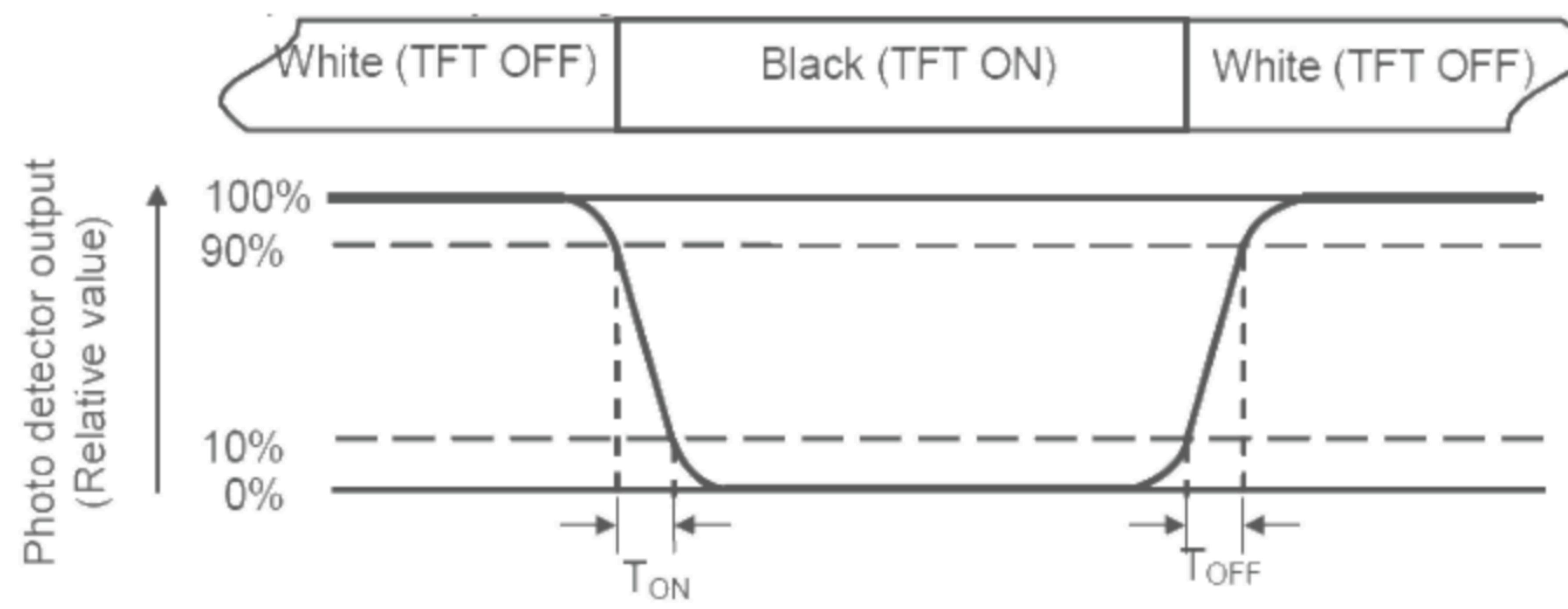
“White state “: The state is that the LCD should drive by V_{white} .

“Black state”: The state is that the LCD should drive by V_{black} .

V_{white} : To be determined V_{black} : To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

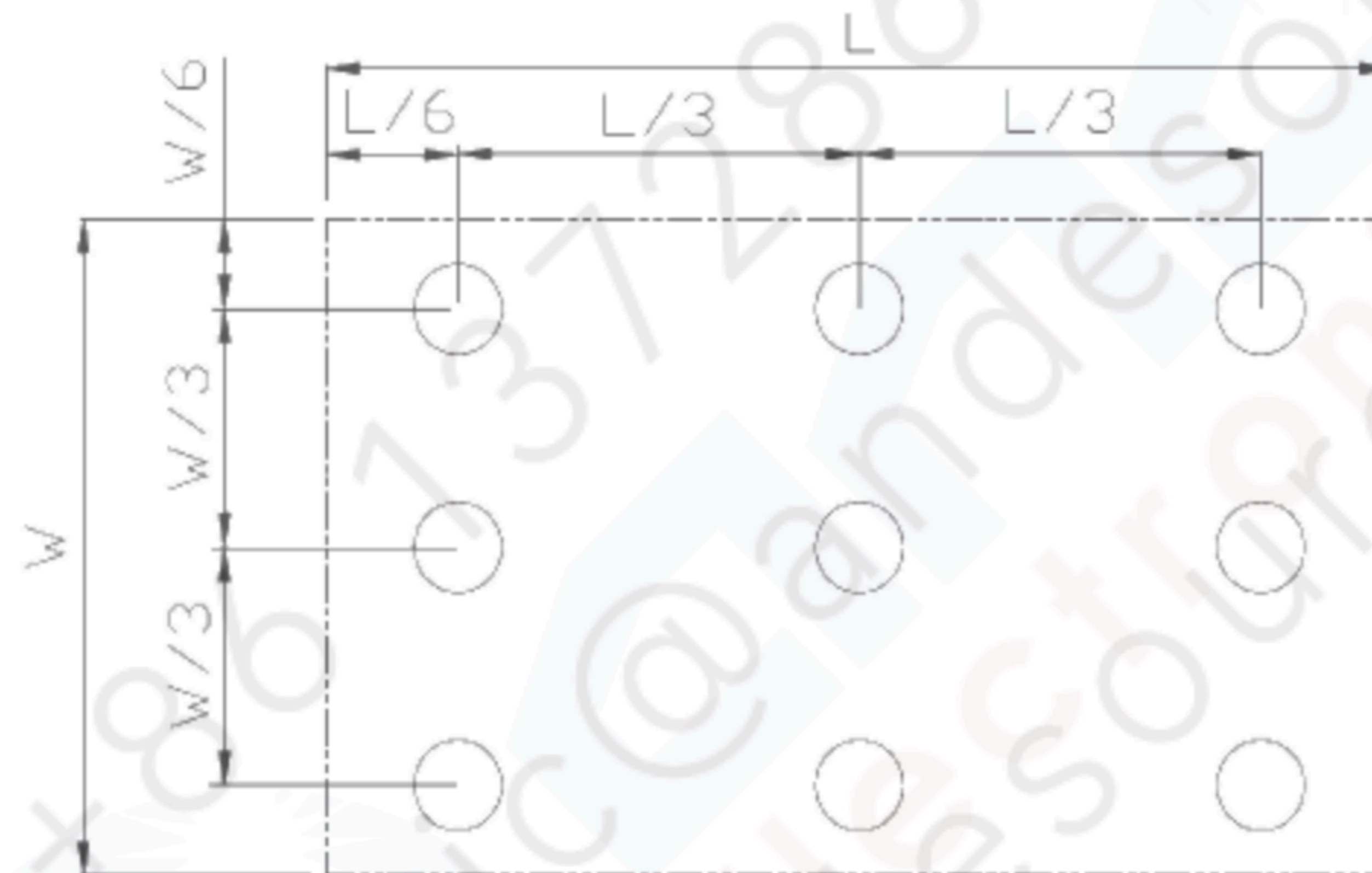
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = L_{min} / L_{max}

L-----Active area length W----- Active area width



L_{max} : The measured Maximum luminance of all measurement position.

L_{min} : The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

8 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 240 hours	IEC60068-2-1 GB2423.2
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1 GB2423.1
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1 GB2423.2
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1 GB2423.1
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max, 240 hours	IEC60068-2-78 GB/T2423.3
6	Thermal Shock (non-operation)	-30℃ 30 min ~ +80℃ 30 min, Change time: 5 min, 100 Cycle	Start with cold temperature, End with high temperature, IEC60068-2-14, GB2423.22
7	ESD	C=150pF, R=330Ω, 5 point/panel Air: ±8Kv, 5 times; Contact: ±4Kv, 5 times (Environment: 15℃ ~ 35℃, 30% ~ 60% RH, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2
8	Vibration Test	Frequency range: 10 ~ 55 Hz Stroke: 1.5 mm Sweep: 10 Hz ~ 55 Hz ~ 10 Hz 2 hours for each direction of X.Y.Z. (6 hours for total)	IEC60068-2-6 GB/T2423.10
9	Mechanical Shock (Non Op)	Half Sine Wave 100G 6ms, ±X, ±Y, ±Z 3 times for each direction	IEC60068-2-27 GB/T2423.5
10	Package Drop Test	Height: 60 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of samples.

Note3: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

9 Mechanical Drawing



11 Precautions for Use of LCD Modules

11.1 Handling Precautions

- 11.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- 11.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- 11.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- 11.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- 11.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:
 - Isopropyl alcohol
 - Ethyl alcoholSolvents other than those mentioned above may damage the polarizer. Especially, do not use the following:
 - Water
 - Ketone
 - Aromatic solvents
- 11.1.6 Do not attempt to disassemble the LCD Module.
- 11.1.7 If the logic circuit power is off, do not apply the input signals.
- 11.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - 11.1.8.1 Be sure to ground the body when handling the LCD Modules.
 - 11.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.
 - 11.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - 11.1.8.4 The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

11.2 Storage precautions

- 11.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
- 11.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:
Temperature : 0℃ ~ 40℃ Relatively humidity: ≤80%
- 11.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

11.3 Transportation Precautions

- 11.3.1 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

11.4 SAFETY PRECAUTIONS

- a. When you waste damaged or unnecessary LCDs, it is recommended to crush LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.
- b. If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

- c. Be sure to turn off the power supply when inserting or disconnecting the LED backlight cable.
- d. LED driver should be designed carefully to limit or stop its function when over current is detected on the LED.

11.5 screen saver

Not display the fixed pattern for a long time because it may cause image sticking. Use a screen saver, if the fixed pattern is displayed on the screen