DATA MODUL

TIANMA

Specification

P0840SVN1MB00

8.4" - 800x600 – LVDS

Spec Revision: 1.0
Revision Date: 16.08.2023

Note: This specification is subject to change without prior notice

Passion Displayed

SPECIFICATION

[◉] Preliminary Specification
[ ] Final Specification

Description **8.4” 800xRGBx600 TFT-LCD Module**

Part Number **P0840SVN1MB00**

Customer		Industrial Product Dept, PDBU Tianma Microelectronics Co., Ltd.	
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* This cover page is for your Comments and Signatures back to TIANMA.

REVISION HISTORY

Rev	Date	Page	Revision Items	Editor
1.0	2023/08/16	-	Preliminary spec	Hongwei Liu

CONTENTS

1. Summary

1.1 General Description

This is a 8.4 inch a-Si TFT-LCD module with Normal- White technology. It is composed of a TFT-LCD panel, a driver circuit, PCB and a LED backlight unit.

1.2 Features

- Interface: LVDS interface(6/8 bit selectable)
- Acquisition product for UL62368-1/CSA C22.2 No.62368-1-03 (File number: E170632)
- 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	Unit
Display Spec	Size	8.4 inch	
	Resolution	800(RGB) x 600	
	Pixel Pitch	0.213×0.213	mm
	TFT Active Area	170.4 (W) X127.8(H)	mm
	Technology Type	a-Si	
	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)	203x 142.5 x 5.7	mm
	Weight	TBD	g
Optical Characteristics	Luminance	350	cd/m^2
	Contrast Ratio	500:1	
	NTSC	50	%
	Viewing Angle	70/70/60/70(TN)	degree
Electrical Characteristics	Interface	LVDS 6/8 bit	
	Color Depth	262K/16.7M	color
	Power Consumption	LCD:515 ; Backlinght:1520	mW

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
LCD Module connector	DF19K-20P-1H（54）(HRS)
Matching connector	DF19K-20S-1H（54）(HRS)　or equivalent

Table 3.1.1 Connector information

No	Symbol	I/O	Description	Comment
1	VDD	P	Power supply	
2	VDD	P	Power supply	
3	UD	I	Vertical Reverse Scan Control	Note 3
4	LR	I	Horizontal Reverse Scan Control	Note 3
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 3.1.2 Pin Assignment for LCD Interface

Note1: I/O definition: I---Input, O---Output, P---Power/Ground, N---No connection
Note2: All of the GND pins should be connected to the system ground.
Note3: 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 (Back Light)

Connector Information	
LCD Module connector	3808K-F04N-03R (Entery)
Matching connector	H208K-P04N-02B (Entery)

Table 3.2.1 Connector information

No	Symbol	I/O	Description	Wire Color
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	

Table 3.2.2 Pin Assignment for Back Light Interface

Note1: I/O definition: I---Input, O---Output, P---Power/Ground, N---No connection
Note2: All of the GND pins should be connected to the system ground.

4. Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Logic supply voltage for LCD	VDD	-0.5	5.0	V	Note1
Logic supply voltage for backlight	VBL	-0.3	15	V	
Function signal for LED driver	BL_EN	-0.3	15	V	
	Dimming	-0.3	15	V	
Operating Temperature	Top	-20	70	℃	
Storage Temperature	Tst	-30	80	℃	
Relative Humidity Note2	RH	--	≤95	%	Ta≤40℃
		--	≤85	%	40℃＜Ta≤50℃
		--	≤55	%	50℃＜Ta≤60℃
		--	≤36	%	60℃＜Ta≤70℃
		--	≤24	%	70℃＜Ta≤80℃
Absolute Humidity	AH	--	≤70	g/m³	Ta＞70℃

Table 4.1 Absolute Maximum Ratings

Note1: Input voltage include all input data.
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. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed

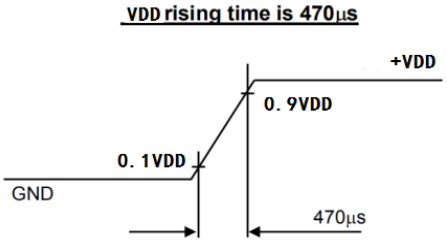
5. Electrical Characteristics

5.1 DC Characteristics for Panel Driving

Item	Symbol	Min	Typ	Max	Unit	Remark
POWER Supply Voltage	VDD	3.0	3.3	3.6	V	
Low level input voltage	VIL	0		0.3 VDD	V	Input voltage include SEL68
High level input voltage	VIH	0.7VDD		VDD	V	
Current of VDD Power supply	Ivdd	-	156	234	mA	Note1
Power consumption of VDD	Wvdd	-	515	-	mW	
Inrush current of VDD	Irush	-	-	1.5	A	Note2

Table 5.1 Operating Voltages

Note1: To test the current dissipation, use “all Black Pattern”.
Note2: Inrush current definition.



5.2 DC Characteristics for LVDS

Item	Symbol	Min	Typ	Max	Unit	Remark
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	

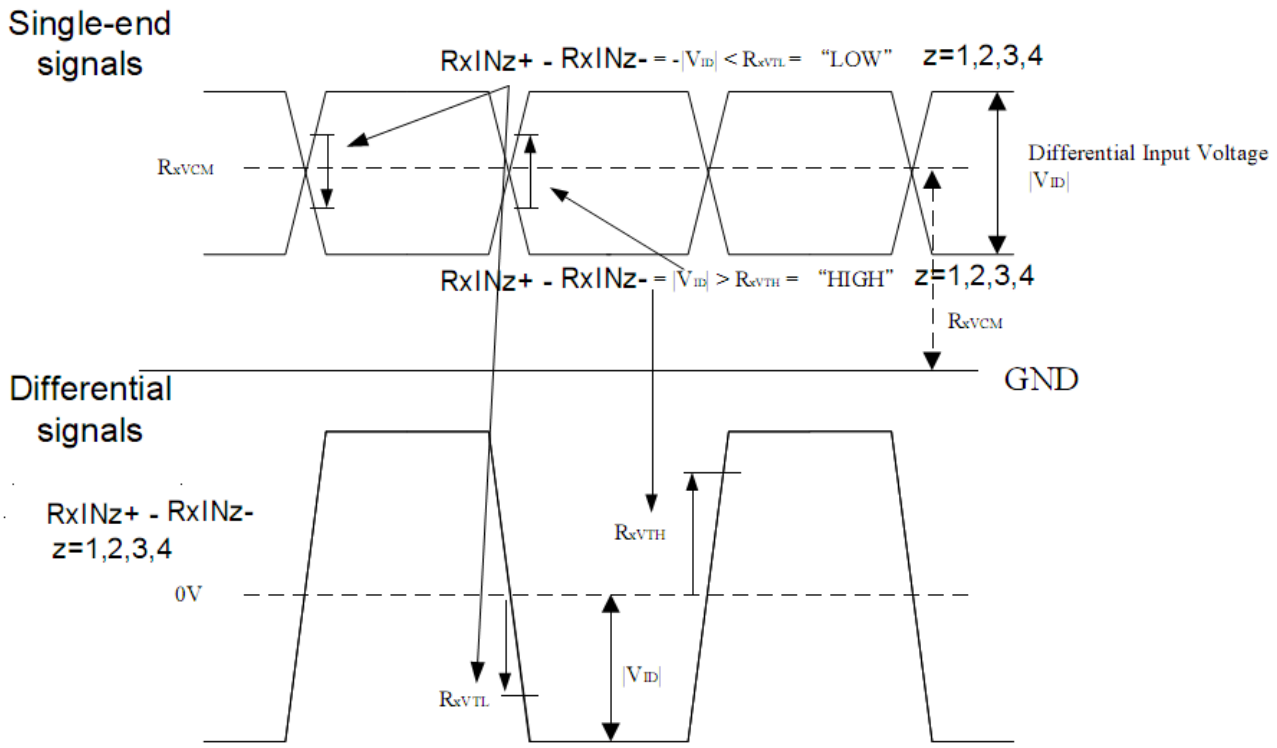


Figure 5.1 LVDS Input Timing

5.3 DC Characteristics for Backlight Driving

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Voltage of LED driver circuit	VBL	11.5	12	12.5	V	Voltage of LED driver circuit Current of LED driver circuit Power Consumption Dimming Signal frequency LED Life time
High level	BL_EN	1.6	-	5	V	
Low level	Dimming	0	-	0.8	V	
Inrush current of VBL	Irush	-	-	1.5	A	
Current of LED driver circuit	I_F	-	12		mA	
Power Consumption	W_{BL}	-	1524	-	mW	
Dimming Signal frequency	Fdimming	0.1		8	KHz	
Dimming Signal duty	-	1	-	100	Dimming Signal duty	
LED Life time	-	--	50000	--	H	

Table 5.3 LED Backlight Characteristics

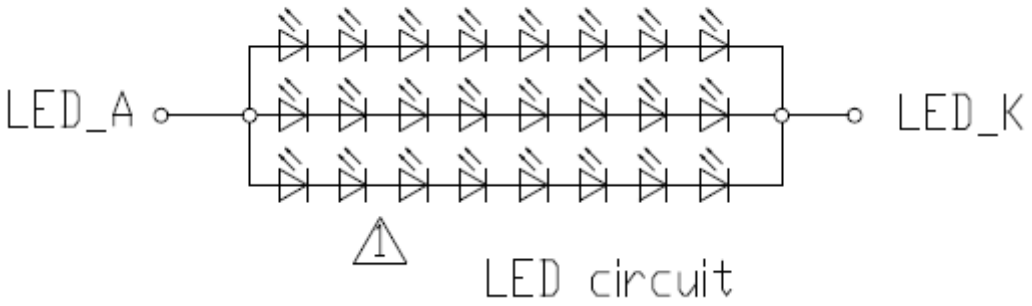
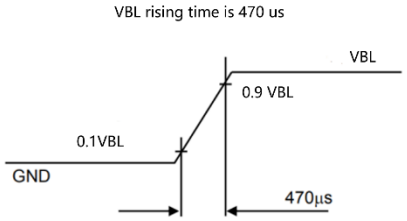


Figure 5.3 Backlight

Note1: I_F is defined for each channel.
Note2: Optical performance should be evaluated at Ta=25℃ only.
Note3: If LED is driven by high current, high ambient temperature & humidity condition,The life time of LED will be reduced.
Note4: Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is estimated data.
Note 5: According to LED driver IC characteristics, the minimum value of Dimming duty may vary with Dimming frequency, higher the frequency, bigger the duty.
Note6: Inrush current definition.



5.4 Recommended Power ON/OFF Sequence

Power ON Sequence

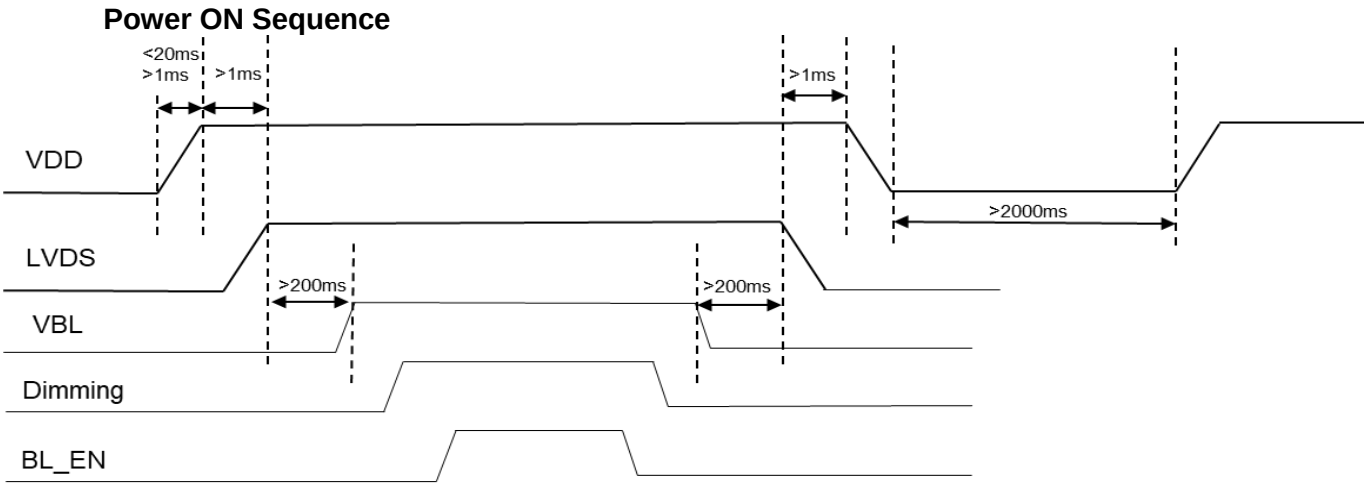


Figure 5.3.1Power on sequence

Note1: The low level of these signals and analog powers are GND level.
Note2: All of the power and signals should be kept at GND level before power on. If there are residual voltages on them, the LCD might not work properly.
Note3: The power on/off sequence is the first version. It will be updated when the design is fixed.
Note4: BL is the voltage applied to backlight. Keep it turned off until the display has stabilized.

5.5 LCD Module Block Diagram

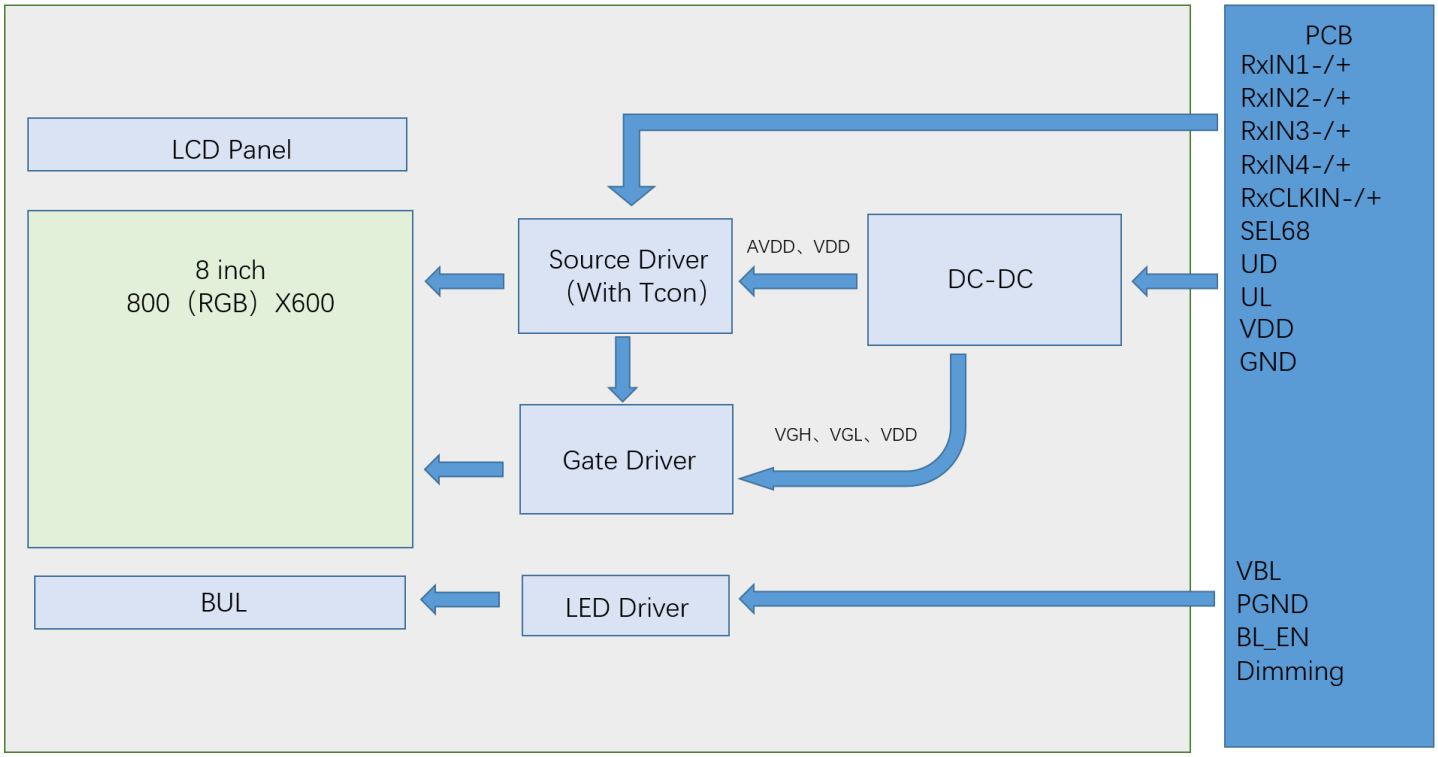


Figure 5.5 LCD Module Block Diagram

6. Interface Timing Characteristics

6.1 Input signal AC timing characteristics

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 6.1 Input signal AC Timing Parameters Requirement

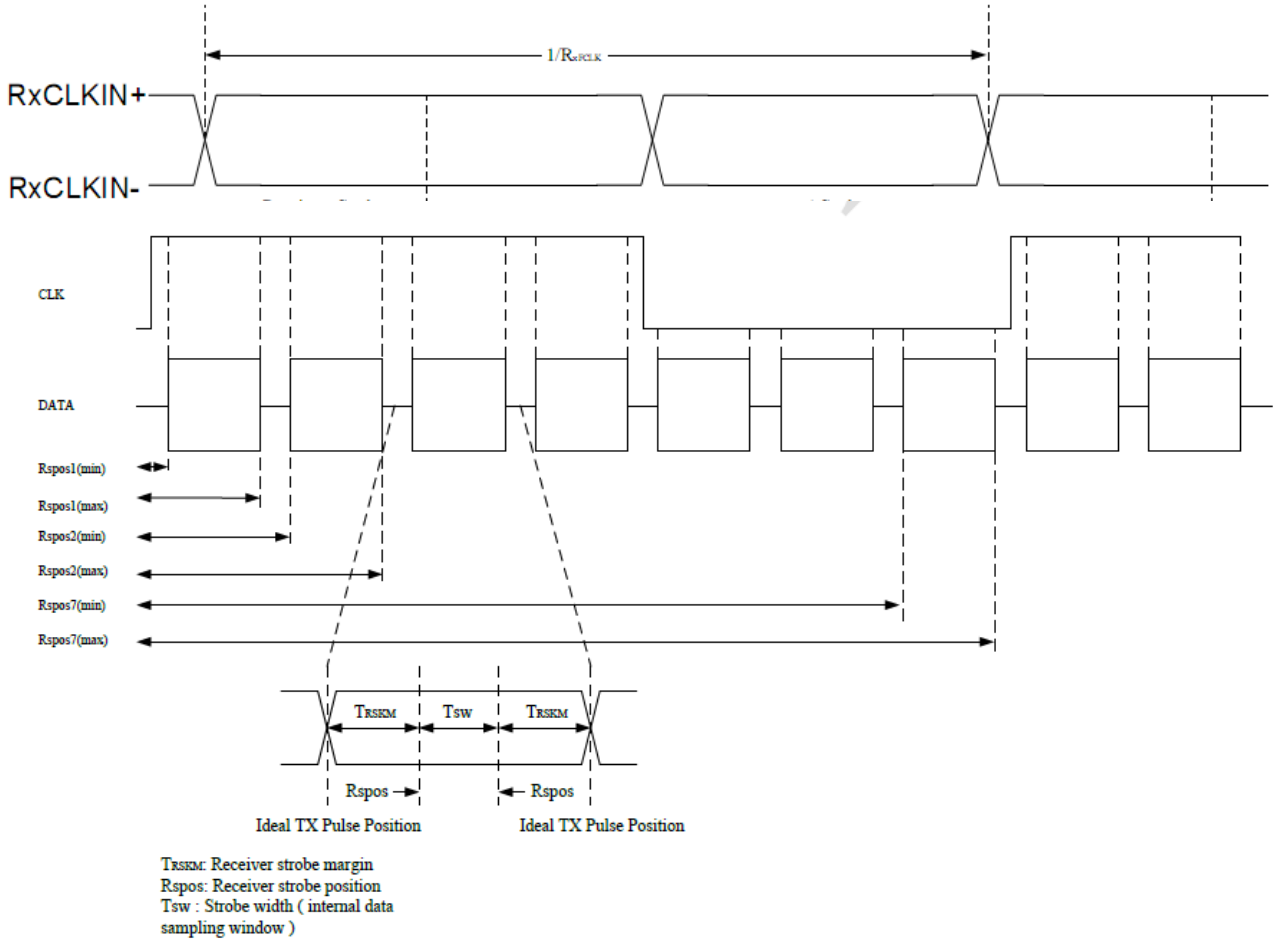


Figure 6.1. Input signal AC timing Diagram

6.2 Data Input Timing Parameter Setting

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 6.2 Data Input Timing Parameters

6.3 LVDS DE mode Data Format

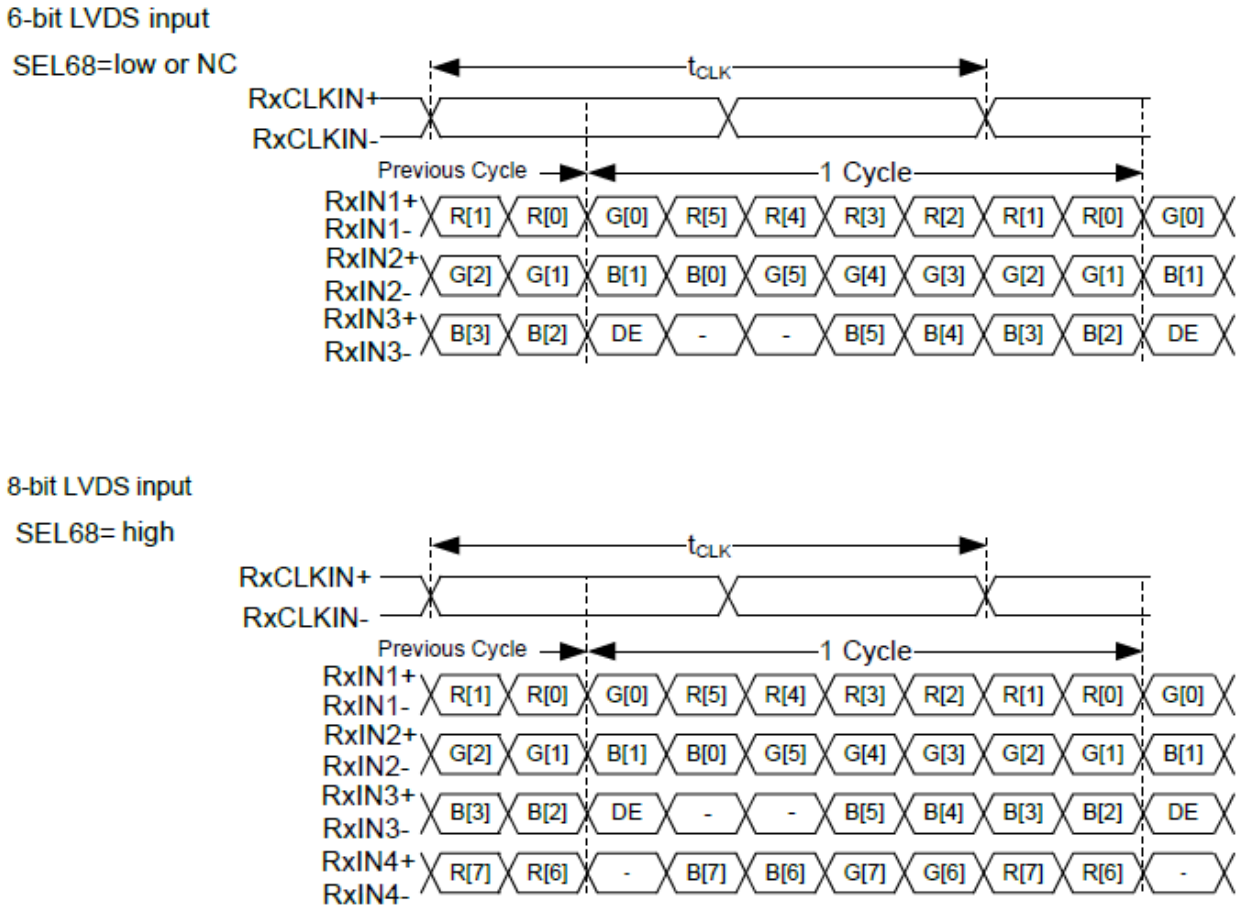


Figure 6.3. Data Input Timing Diagram Under DE Mode

7. ical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	50	60	-	degree	Note2,3
		θB		60	70	-		
		θL		60	70	-		
		θR		60	70	-		
Contrast Ratio		CR	θ=0°	400	500	-		Note 3
Response Time		T_{ON}	25℃		20	30	ms	Note 4
		T_{OFF}						
Chromaticity	**White**	x	Backlight is on	0.25	0.300	0.35		Note 1,5
		y		0.281	0.331	0.381		
	Red	x		0.546	0.596	0.646		Note 1,5
		y		0.281	0.331	0.381		
	Green	x		0.296	0.346	0.396		Note 1,5
		y		0.539	0.589	0.639		
	Blue	x		0.103	0.153	0.203		Note 1,5
		y		0.054	0.104	0.154		
Uniformity		U		70	75		%	Note 6
NTSC		-		45	50		%	Note 5
Luminance		L		280	350		cd/m^2	Note 7

Table 7.1 Optical Parameters

Test Conditions:

1. I_F= 160 mA, V_F=9.6 V, and the ambient temperature is 25℃.
2. The test systems refer to Note1 and Note2.

Note1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. The optical characteristics are measured at the center point of the LCD screen.

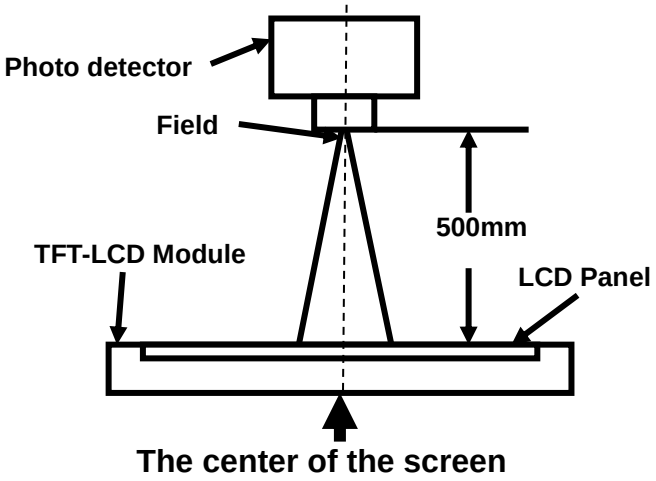


Fig1.Measurement Set Up

Note2: Definition of viewing angle range and measurement system. Viewing angle is measured at the center point of the LCD 。

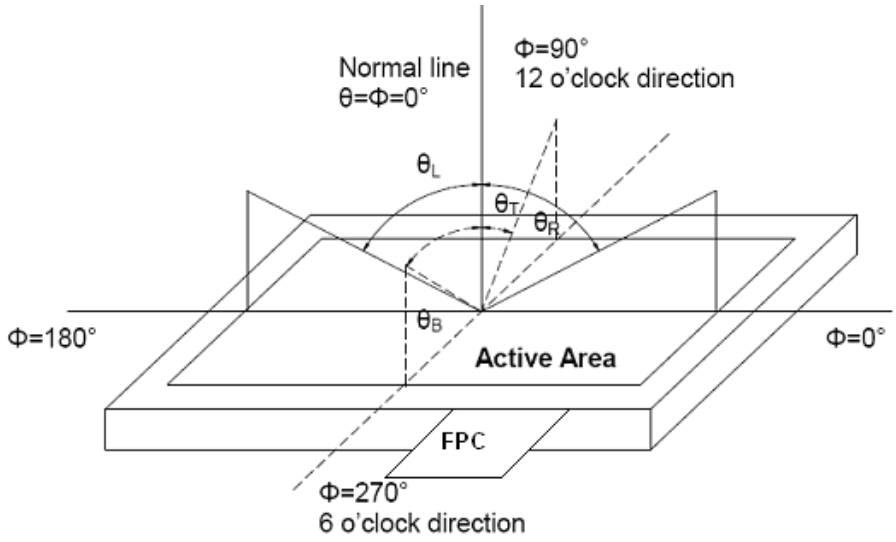


Fig2. Measurement viewing angle

Note3: Definition of contrast ratio

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

Note4: Definition of Response time

For TN LCM,the response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_r) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_f) is the time between photo detector output intensity changed from 10% to 90%.

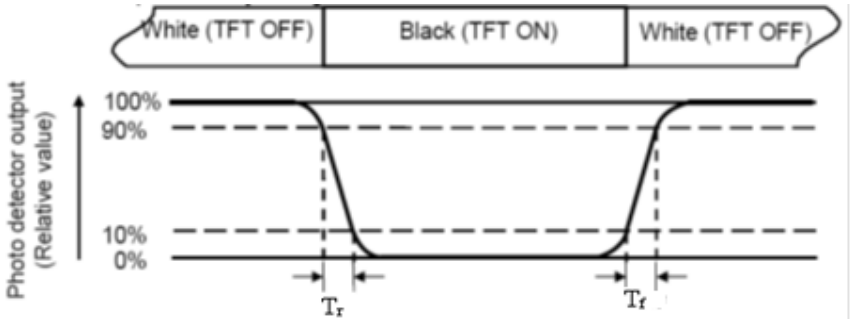


Fig3. Response Time Testing(TN)

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig.5). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax

Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

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

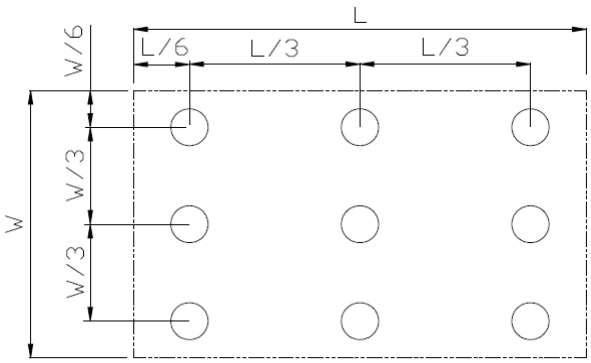


Fig5. Luminance Uniformity Measurement Locations(9 points)

Note7: Definition of Luminance:

Measure the luminance of white state at center point.

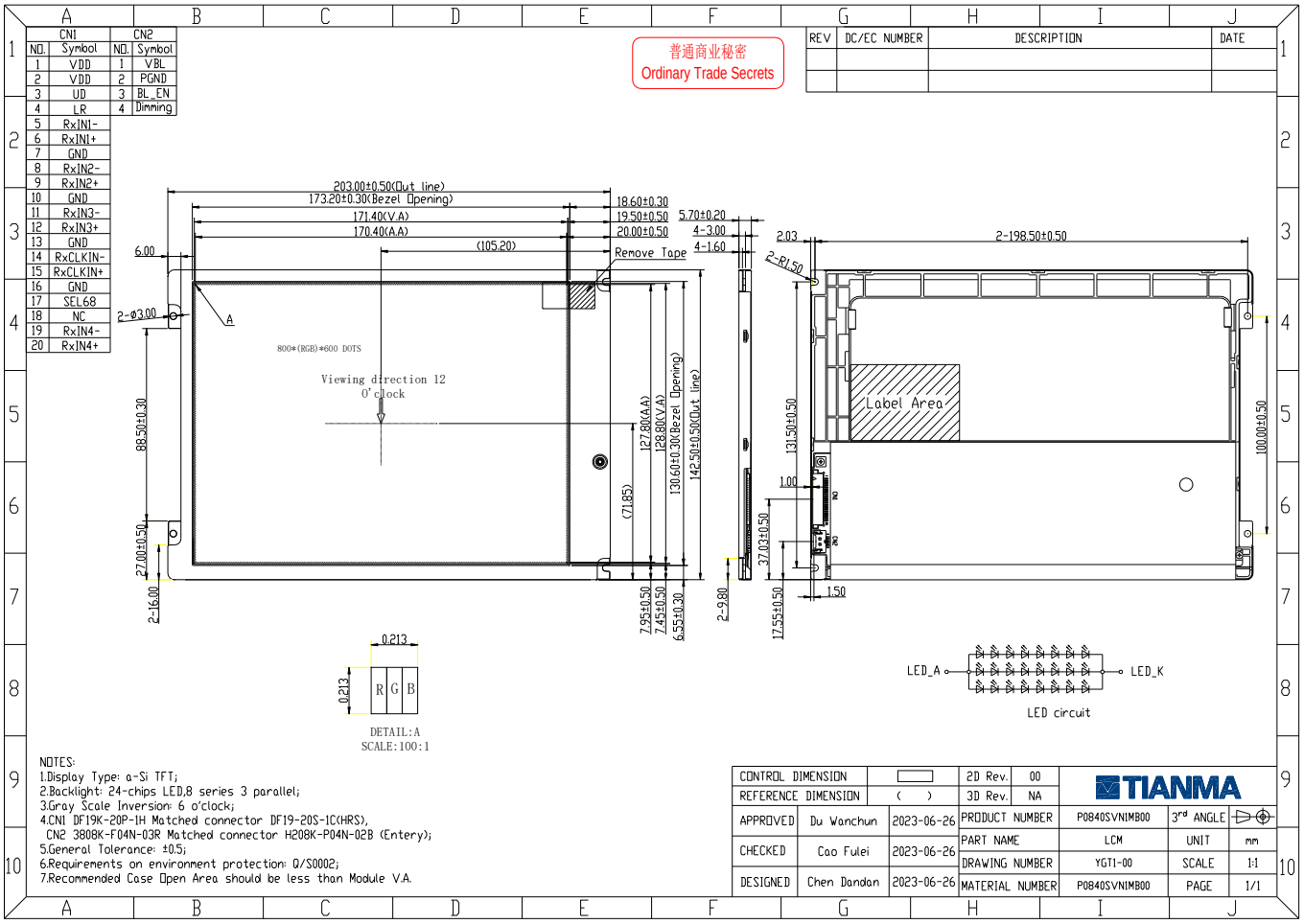
8. Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity(Operation)	Ta = +60℃, 90% RH max,240hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 100 Cycle	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
7	ESD	C=150pF,R=330Ω,5point/panel Air:±8Kv,5times; Contact:±4Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 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 3times for each direction	IEC60068-2-27 GB/T2423.5
10	Package Drop Test	Height:60cm, 1corner,3edges,6surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

Table 8.1 RA test condition

Note1: Temperature is the ambient temperature of sample
Note2: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.
Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product's function only be guaranted, but not for all of the cosmetic specification.

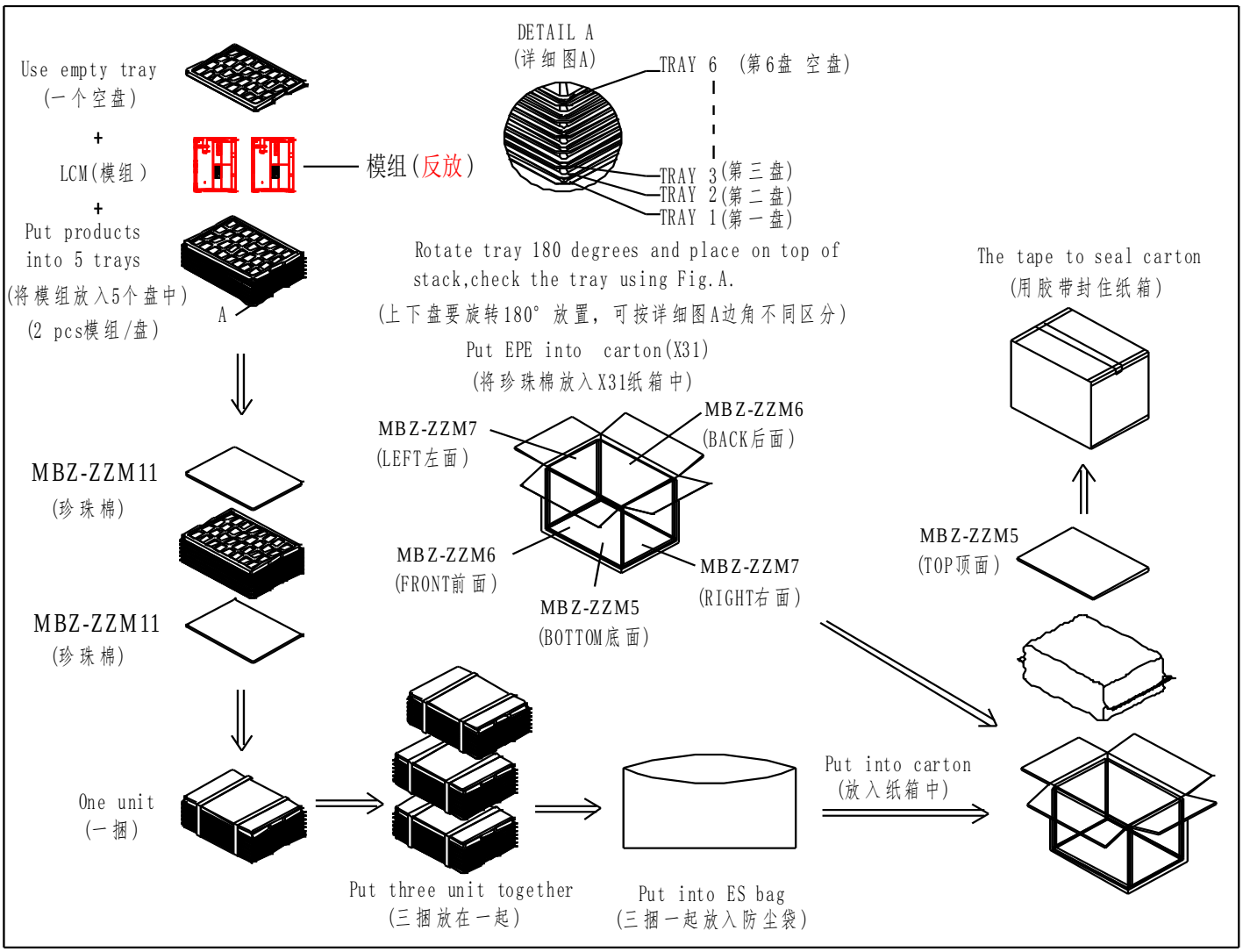
9. Mechanical Drawing



10. Packing Instruction

No	Item	Material	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	P0840SVN1MB00	203X142.5X5.7	TBD	36	
2	Tray	PET	460×300×18.2	0.218	18	
3	Bag	PE	700×550	TBD	1	Anti-static
4	EPE	MBZ-ZZM5	490*330*15	TBD	2	
5	EPE	MBZ-ZZM6	490*300*15	TBD	2	
6	EPE	MBZ-ZZM7	300*300*15	TBD	2	
7	EPE	MBZ-ZZML11	470*310*12	TBD	6	
9	Total weight	TBD±10%				

Table10.1 Packing instruction



11. Precautions for Use of LCD Modules

11.1 Handling Precautions

(1) The display panel is made of glass. Do not subject it to mechanical shock by dropping it, etc.
(2) If the display panel is damaged and the liquid crystal fluid inside it leaks out be sure not to get any in your mouth. If the fluid comes into contact with your skin or clothes promptly wash it off using soap and water.
(3) Do not apply excessive force to the display surface or the bezel since this may cause the color tone to vary.
(4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle the polarizer carefully.
(5) If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is still not completely clear use a moist cloth with one of the following solvents:
- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Specifically, do not use the following:
- Water
- Ketone
- Aromatic solvents

(6) Do not disassemble the LCD Module.
(7) If powered off, do not apply the input signals.
(8) To prevent destruction of the module by static electricity, be careful to maintain an optimum work environment.
(9) Be sure to ground your body when handling the LCD Modules.
(10) Tools used for assembly, must be properly grounded.
(11) To reduce the amount of static electricity generated, do not conduct assembly or other work under very low humidity conditions.
(12) The LCD Module is covered with a film to protect the display surface, remove film slowly under the ionizer.

11.2 Storage precautions

(1) When storing the LCD modules avoid exposure to direct sunlight or to the light of fluorescent lamps.
(2) The LCD modules should be stored within the rated storage temperature range. The recommend condition is: Temperature: 0 ~ 35 ℃ at normal humidity.
(3) The LCD modules should be stored in a room without acid, alkali or other harmful gas.

11.3 Transportation Precautions

The LCD modules should not be dropped or subject to violent mechanical shock during transportation. Also they should avoid excessive pressure, water, high humidity and direct sunlight.

11.4 Screen saver Precautions

Not display the fixed pattern for a long time. Use a screen saver, if the fixed pattern is displayed on the screen

11.5 Safety Precautions

(1) 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
(2) Be sure to turn off the power supply when inserting or disconnecting the LED backlight cable.
(3) LED driver should be designed carefully to limit or stop its function when over current is detected on the L ED.

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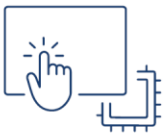

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