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TIANMA

Model No.

MODEL NO : P0700WVF1MA10

MODEL VERSION:

SPEC VERSION : 0.0

ISSUED DATE:

■**Preliminary Specification**

□**Final Product Specification**

Customer :

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by

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This technical specification is subjected to change without notice

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Record of Revision

Rev	Issued Date	Description	Editor
1.0	2021-06-10	Preliminary release.	Yangyang

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1 General Specifications

Feature		Spec
Display Spec.	Size	7inch
	Resolution	800*480
	Technology Type	a-Si TFT
	Pixel Configuration	RGB Vertical stripe
	Pixel pitch(mm)	0.1905 x 0.1905
	Display Mode	Normal black(SFT)
	Surface Treatment	AG
	Viewing Direction	all direction
Mechanical Characteristics	LCM (W x H x D) (mm)	169.80x109.70x8.90（Max)
	Active Area(mm)	152.40（W）×91.44（H）
	With /Without TSP	Without TSP
	Matching Connection Type	CN1: FI-SEB20P-HFE(JAE) CN2: FI-S6P-HFE(JAE)
	LED Numbers	14pcs(2P7S)
	Weight (g)	TBD
Electrical Characteristics	Interface	1port LVDS DE mode ,6/8bit selectable
	Color Depth	262K/16.7M

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

Note 2: Requirements on Environmental Protection: Q/S0002

Note 3: LCM weight tolerance: ± 5%

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2 Input / Output Terminals

2.1 LCD Connector CN1：

Connector type: FI-SEB20P-HFE (JAE)
Matching Connector: FI-S20S(JAE) or compatible

PIN	Symbol	I/O	Description	Remark
1	VCC	P	Power supply(+3.3V)	
2	VCC	P	Power supply(+3.3V)	
3	GND	P	Ground	
4	GND	P	Ground	
5	Link 0-	I	-LVDS differential data input 6 bit input: (R0~R5, G0) 8 bit JEIDA input: (R2~R7, G2)	
6	Link 0+	I	+LVDS differential data input 6 bit input: (R0~R5, G0) 8 bit JEIDA input: (R2~R7, G2)	
7	GND	P	Ground	
8	Link 1-	I	-LVDS differential data input 6 bit input: (G1~G5, B0~B1) 8 bit JEIDA input: (G3~G7, B2~B3)	
9	Link 1+	I	+LVDS differential data input 6 bit input: (G1~G5, B0~B1) 8 bit JEIDA input: (G3~G7, B2~B3)	
10	GND	P	Ground	
11	Link 2-	I	-LVDS differential data input 6 bit input: (B2~B5, -, -, DE) 8 bit JEIDA input: (B4~B7, -, -, DE)	
12	Link 2+	I	+LVDS differential data input 6 bit input: (B2~B5, -, -, DE) 8 bit JEIDA input: (B4~B7, -, -, DE)	
13	GND	P	Ground	
14	CLKIN-	I	-LVDS clock input	
15	CLKIN+	I	+LVDS clock input	
16	GND	P	Ground	
17	Link 3-	I	-LVDS differential data input 8 bit JEIDA input: (R0~R1, G0~G1, B0~B1, -)	Note 1
18	Link 3+	I	+LVDS differential data input 8 bit JEIDA input: (R0~R1, G0~G1, B0~B1, -)	
19	MODE	I	MODE=High or open, 8 bit JEIDA MODE=Low , 6 bit	
20	SC	I	Scan direction control SC=Low or open, Normal SC=High, Reverse	Note 2

Table 2.1 terminal pin assignments

I---Input, O---output, P---Power/Ground
Note 1: Connect Link 3+/- to GND in 6 bit mode.
Note 2: Scan direction is shown as below (PCB at down side):

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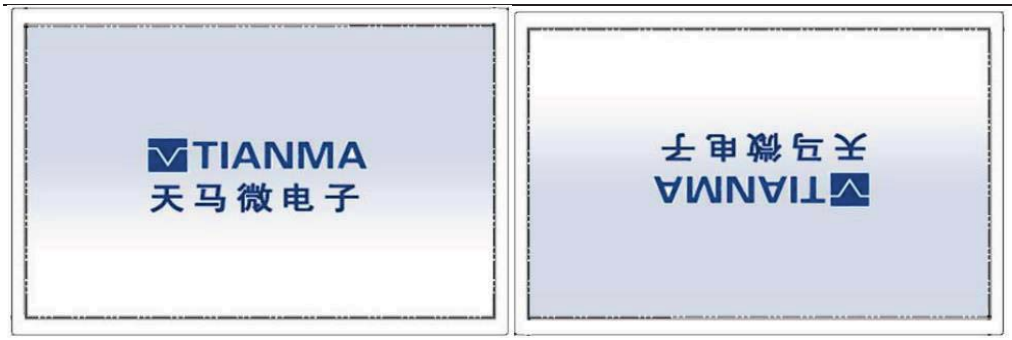

SC=Low or open SC=High

2.2 CN2(Backlight)

BLU Connector CN2：Connector type: FI-S6P-HFE(JAE)
Matching Connector: FI-S6S(JAE)

PIN	Symbol	I/O	Description	Remark
1	VL	P	Power Supply Input Voltage	
2	VL	P	Power Supply Input Voltage	
3	GNDL	P	GND	
4	GNDL	P	GND	
5	BLEN	I	Backlight On-Off (High: ON, Low or Open: Off)	BLEN is pull-down to GND with a 100kΩ resistor on PCB.
6	V_{PDIM}	I	Light Dimming Control (PWM) Input Voltage(High active)	

Table2.2 Backlight pin assignment

3 Absolute Maximum Ratings

Ta=25℃

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.3	5.0	V	
Input Voltage	V_{IN}	-0.3	VCC+0.3	V	Note1
Backlight Power Supply Input Voltage	VL	-0.3	24	V	
Backlight On-Off	BLEN	-0.3	24	V	
Light Dimming Control (PWM) Input Voltage	V_{PDIM}	-0.3	24	V	
Operating Temperature	Top	-30	80	℃	
Storage Temperature	Tst	-40	90	℃	

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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 3 Absolute Maximum Ratings

Note1: V_{IN} represents Link 0-/+, Link 1-/+, Link 2-/+, Link 3-/+, CLKIN-/+, MODE, SC.
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.

4 Electrical Characteristics

4.1 TFT LCD Panel Driving

Ta = 25℃; VCC=3.3V

Item		Symbol	Min	Typ	Max	Unit	Remark
Digital Supply Voltage		VCC	3.2	3.3	3.4	V	
Power Supply ripple		Vp-p	-	-	100	mV	
Supply Current		IVCC	-	TBD	-	mA	Note1
Power consumption		P	-	TBD	-	mW	
Input Signal Voltage	Low Level	V_{IL}	0	-	0.3*VCC	V	Note2
	High Level	V_{IH}	0.7*VCC	-	VCC	V	
Inrush current of VCC		Inrush			1.5	A	

Table 4.1 LCD module electrical characteristics

Note1: To test the current dissipation, using the “white” testing pattern.
Note2: For setting “SC” and “MODE”.

4.2 LVDS mode DC electrical characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Input voltage range (signaled-end)	R_{xVIN}	0	-	VCC-1.2	V	
Differential Input common Mode voltage	R_{xVCM}	$\|V_{ID}\|/2$	-	VCC-1.2-$\|V_{ID}\|/2$	V	
Differential Input voltage	$\|V_{ID}\|$	0.2	-	0.6	V	
Differential Input high Threshold voltage	R_{xVTH}	-	-	+0.2	V	R_{xVCM}=1.2V
Differential Input Low Threshold voltage	R_{xVTL}	-0.2	-	-	V	
Differential Input leakage Current	R_{VXliz}	-10	-	10	μA	
LVDS Digital Stand-by Current	I_{STLVDS}	-	-	1	mA	Clock & all functions are stopped

Table 4.2 LVDS mode DC electrical characteristics

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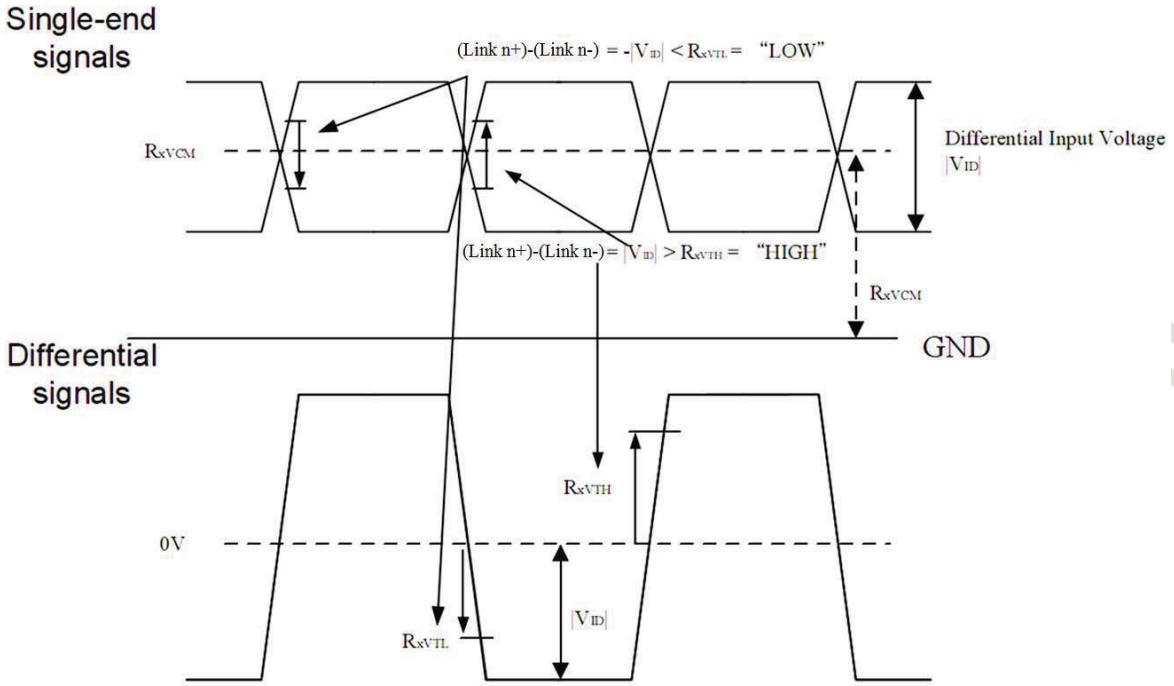

Figure 4.2 LVDS mode DC electrical characteristics

4.3 Driving Backlight

Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage		VL	11.0	12.0	13.0	V	Note1
Power supply current		IL	-	T.B.D.	T.B.D. Note2	mA	At the maximum luminance control
Permissible ripple voltage		VRPD	-	-	100	mVp-p	for VL
Input signal voltage	High	V_{IH}	2.0	-	-	V	for BLEN and VPDIM
	Low	V_{IL}	-	-	0.8		
VPDIM(PWM) frequency		f_{PWM}	120	-	30K	Hz	Note3
LED life time		Hr	-	(70000)	-	Hour	

Table 4.3 Electrical Characteristics

Note1: When designing of the power supply, take the measures for prevention of surge voltage.
Note2: This value excludes peak current such as overshoot current.
Note3: The LED current cannot be 100% proportional to duty cycle especially for high frequency and low duty ratio because of physical limitation caused by inductor rising time.

Dimming Frequency (Hz)	Duty (Min.)	Duty (Max.)
$120<f_{PWM}\leq500$	0.2%	100%
$500<f_{PWM}\leq1k$	0.4%	100%
$1k<f_{PWM}\leq2k$	0.8%	100%
$2k<f_{PWM}\leq5k$	1.5%	100%
$5k<f_{PWM}\leq10k$	3%	100%
$10k<f_{PWM}\leq30k$	10%	100%

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4.4 Fuse

Parameter	Fuse		Rating	Clear-time at 25℃	
	Type	Supplier			
VL for Backlight	F0603HI2000V032T	AEM	32V 2A	4 A	60 seconds(max)

Table 4.3 Fuse

4.5 Module Block diagram

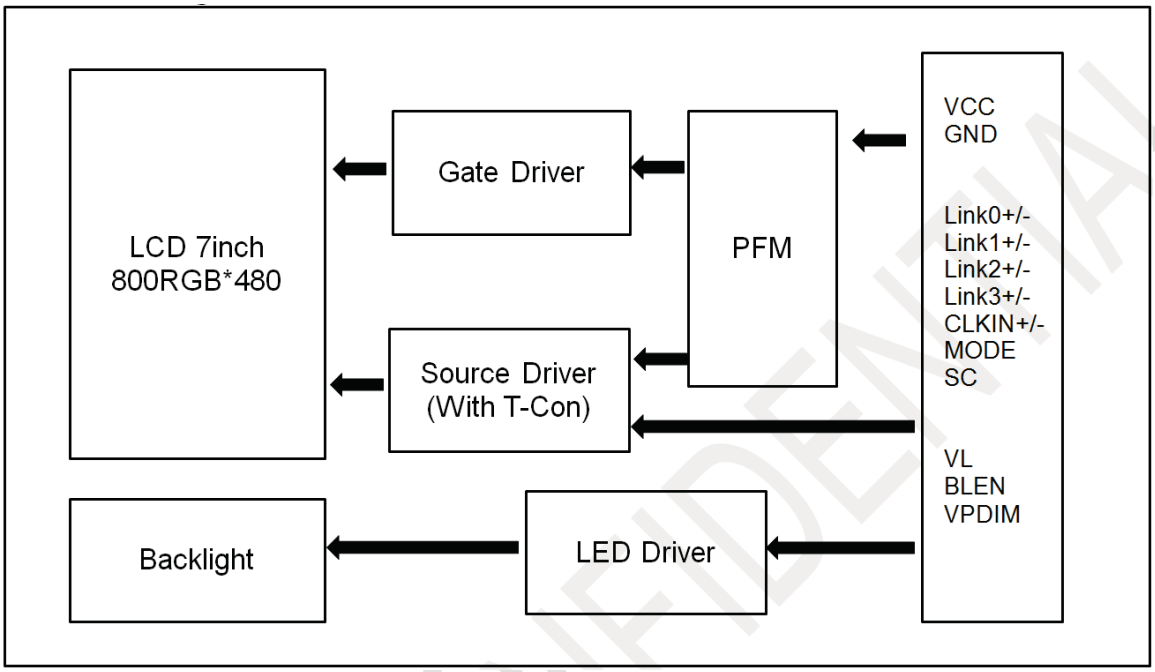

Figure 4.5 Block Diagram

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5 Timing Chart

5.1 Data Input Format for LVDS

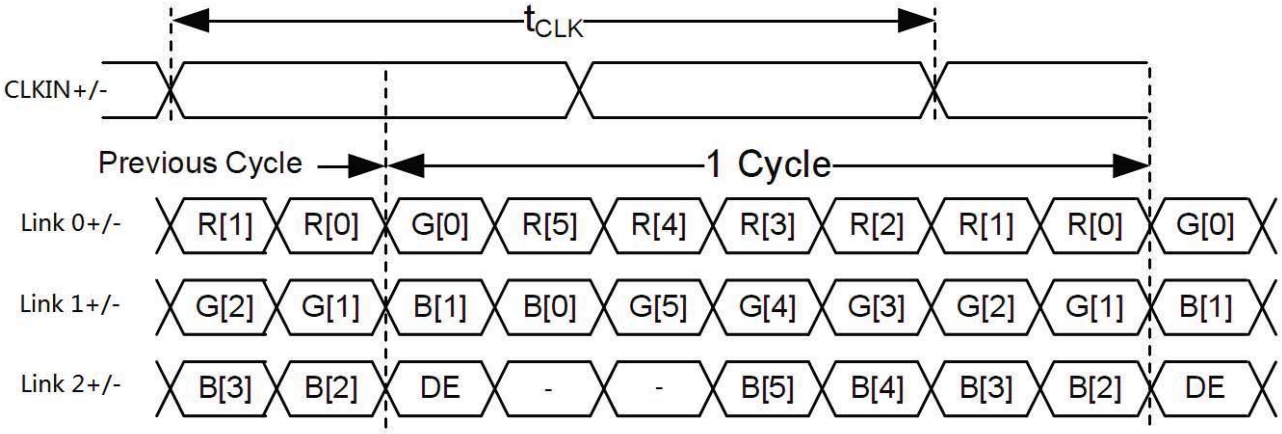
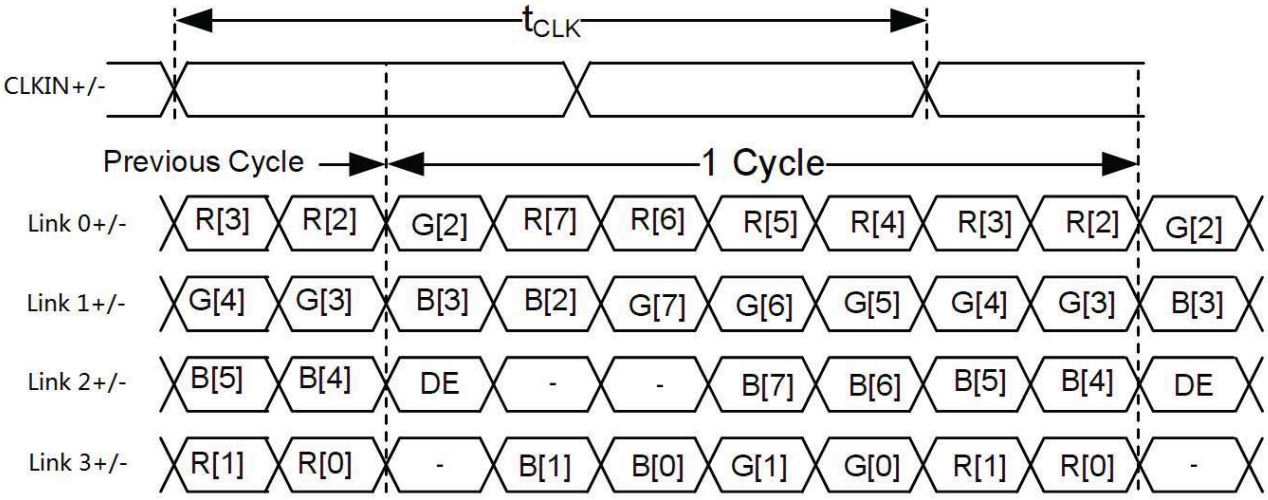


Figure5.1.1 Data Input Format for LVDS 6bit when MODE=L



5.1.2 Data Input Format for LVDS 8bit JEIDA when MODE=H

5.2 LVDS mode AC electrical characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Clock frequency	R_{xFCLK}	25.2	27.2	30.5	MHz	
Input data skew margin	T_{RSKM}	-	-	400	ps	|VID|=400mV RXVCM=1.2V RXFCLK=75MHz
Clock high time	T_{LVCH}	-	$4/(7*R_{xFCLK})$	-	ns	
Clock low time	T_{LVCL}	-	$3/(7*R_{xFCLK})$	-	ns	

Table 5.2 LVDS mode AC electrical characteristics

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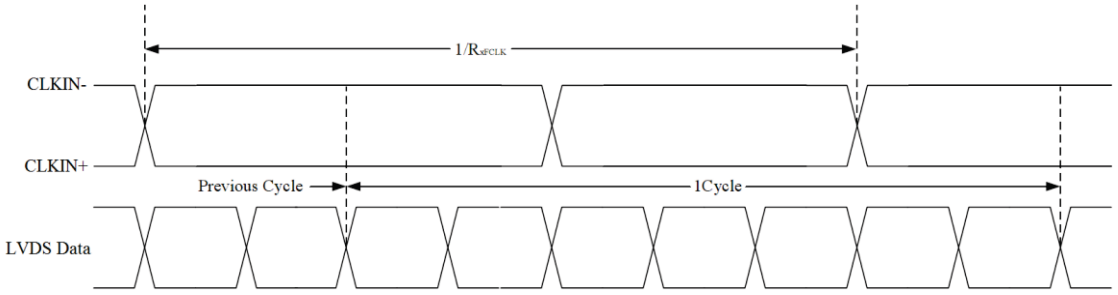
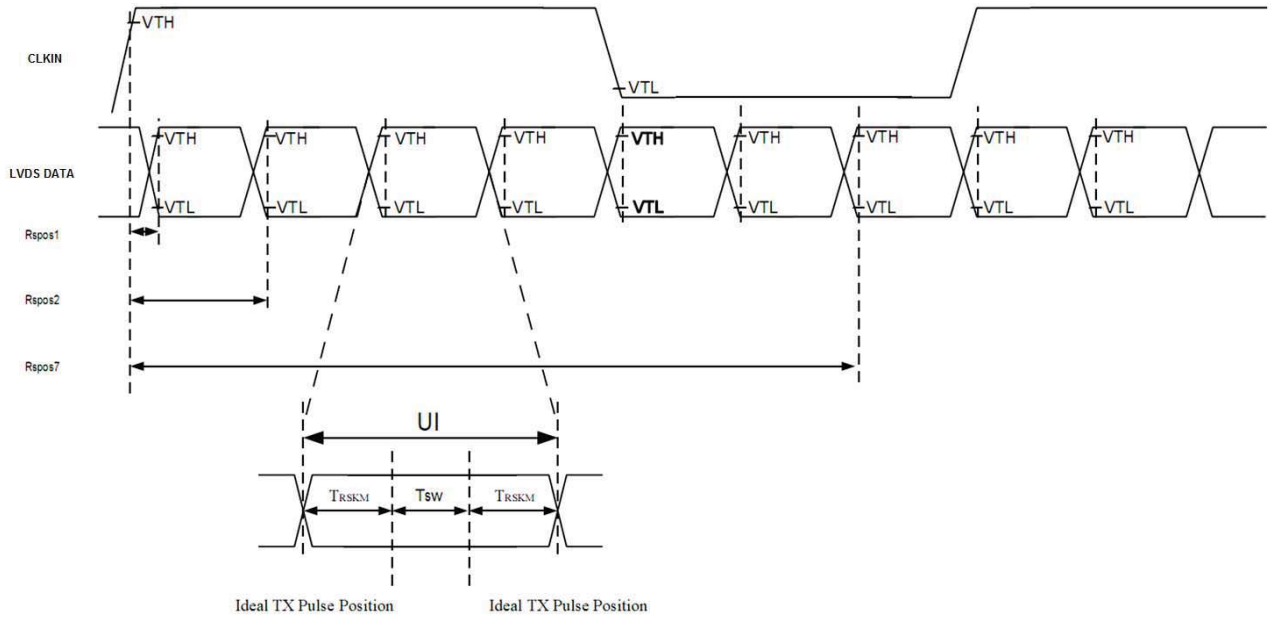


Figure 5.2.1 LVDS mode AC electrical characteristics 1



TRSKM: Receiver strobe margin
Tsw : Strobe width (internal data sampling window)
VTH=Rxvcm+|VID|/2, VTL=Rxvcm-|VID|/2

Figure 5.2.2 LVDS mode AC electrical characteristics 2

5.3 Power on/off sequence for LCD

Item	Symbol	Min	Typ	Max	Unit	Remark
VCC on to VCC stable	t1	1	-	20	ms	-
VCC stable to signal on	t2	1	-	-	ms	-
Signal off before VCC off	t3	1	-	-	ms	-
VCC off to next VCC on	t4	500	-	-	ms	-
Signal on to Backlight on	t5	200	-	-	ms	-
Backlight off before signal off	t6	200	-	-	ms	-

Table 5.3 Power on/off sequence

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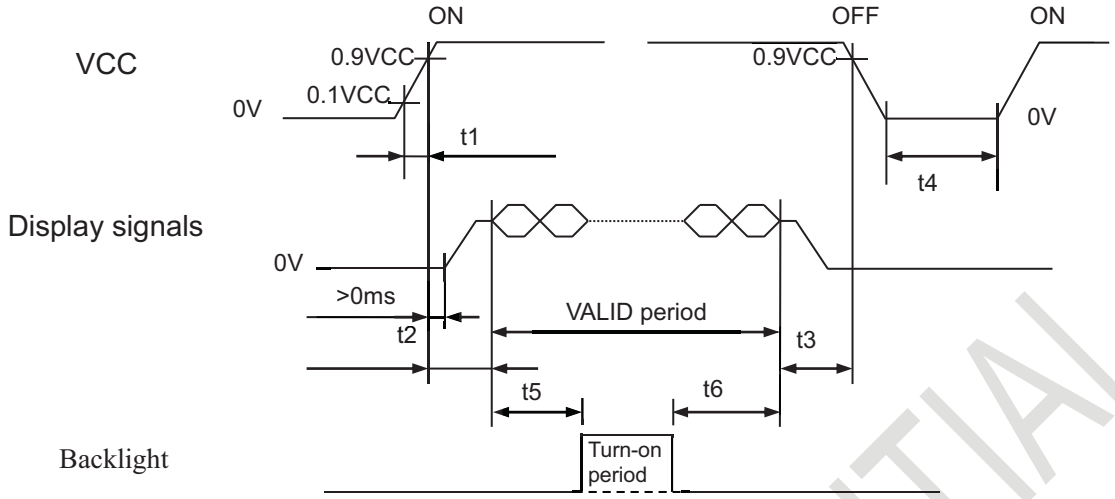

Figure 5.3 Power on/off sequence

5.4 Recommended Input Timing of LVDS transmitter (TTL DE mode)

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK frequency	$1/t_{DCLK}$	25.2	27.2	30.5	MHz	
Horizontal valid data	t_{hd}		800		DCLK	
1 Horizontal Line	t_h	856	860	920	DCLK	
Vertical valid data	t_{vd}		480		t_h	
1 Vertical field	t_v	490	528	552	t_h	
Frame rate	FR		60		Hz	

Table 5.4 Recommended TTL Input Timing of LVDS transmitter

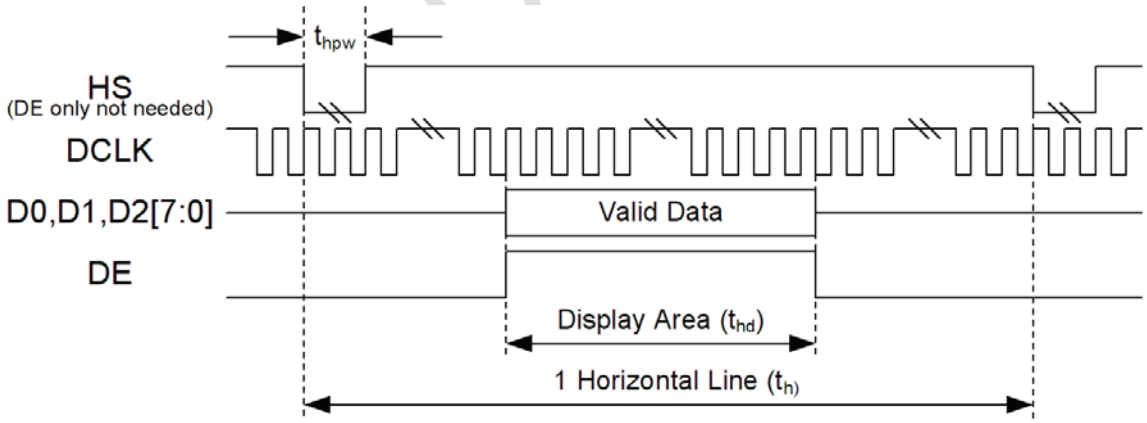

Figure 5.4.1 Horizontal input timing at DE only mode

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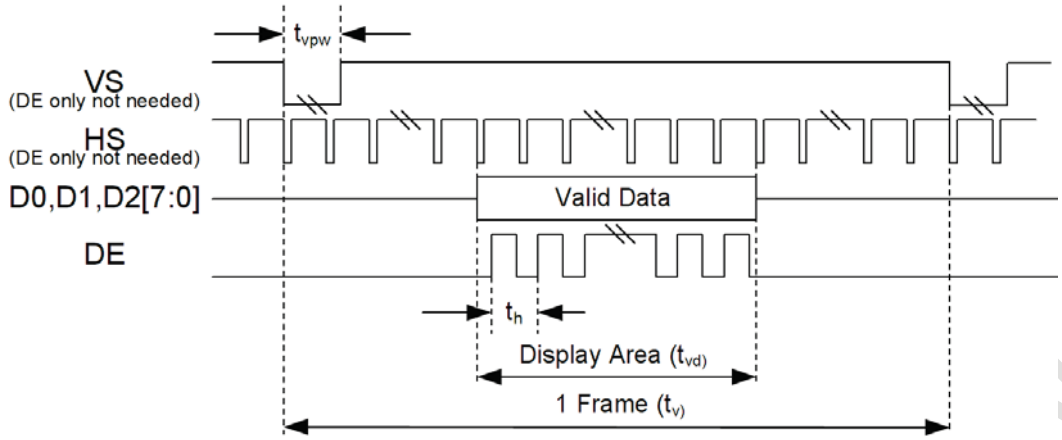

Figure 5.4.2 Vertical input timing at DE only mode

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6 Optical Characteristics

Item	Symbol		Condition	Min	Typ	Max	Unit	Remark
View Angles	θT		CR≧10	75	85	-	Degree	Note2,3
	θB			75	85	-		
	θL			75	85	-		
	θR			75	85	-		
Contrast Ratio	CR		θ=0°	800	1000			Note 3
Response Time	TON		25℃		25	-	ms	Note 4
	TOFF							
Chromaticity	**White**	x	Backlight is on		TBD			Note 1,5
		y			TBD			
	Red	x			TBD			Note 1,5
		y			TBD			
	Green	x			TBD			Note 1,5
		y			TBD			
	Blue	x			TBD			Note 1,5
		y			TBD			
Uniformity	U			75	80		%	Note 6
NTSC				65	70		%	Note 5
Luminance	L			800	1000		cd/m2	Note 7

Test Conditions:

1. IF= **XX** mA, and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

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Note 1: Definition of optical measurement system.

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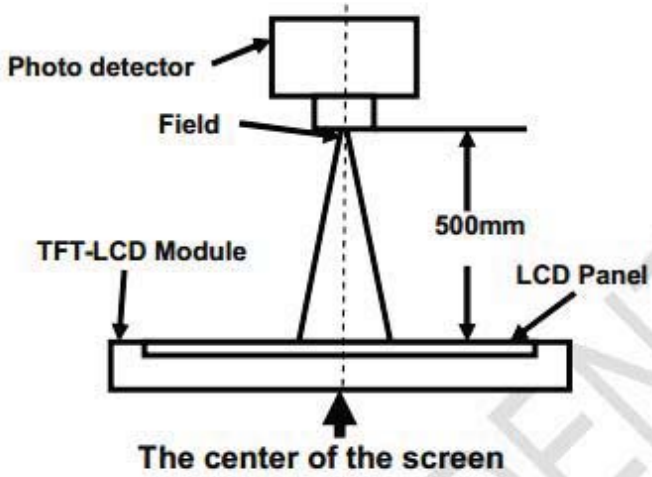
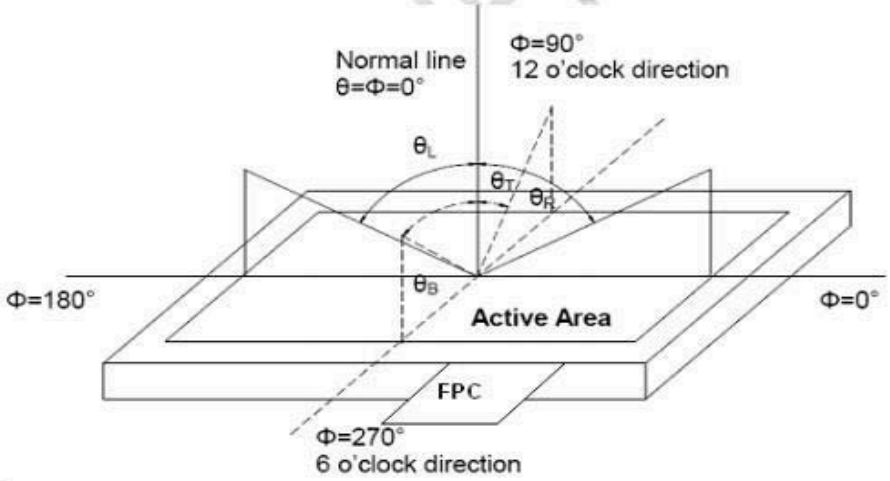
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system.
viewing angle is measured at the center point of the LCD 。



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 Vwhite.
“Black state”: The state is that the LCD should drive by Vblack.
Vwhite: To be determined Vblack: To be determined.

Note 4: Definition of Response time

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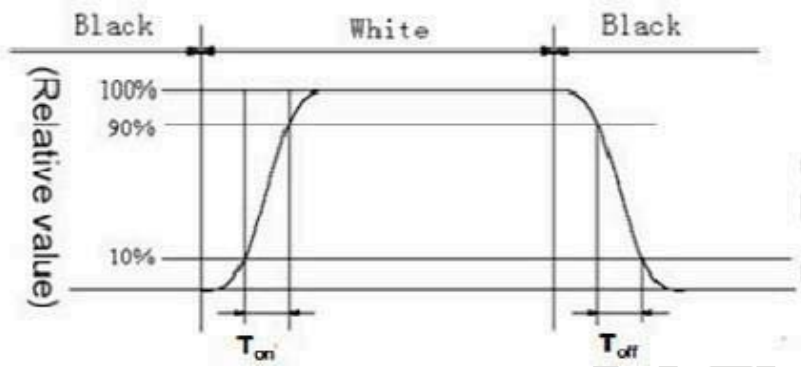
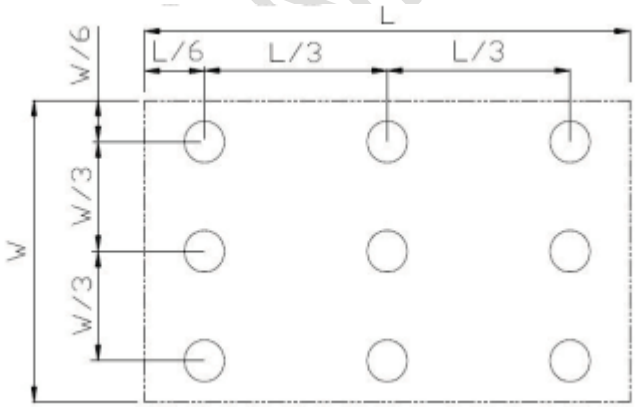
The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 10%to 90%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 90%to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



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) = Lmin/ Lmax
L-------Active area length W----- Active area width



Lmax: The measured Maximum luminance of all measurement position.
Lmin: The measured Minimum luminance of all measurement position.
Note 7: Definition of Luminance:
Measure the luminance of white state at center point.

7 Environmental / Reliability Test

No	Test Item	Condition	Remarks

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1	High Temperature Operation	+80℃, 500hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	-30℃, 500hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	+90℃, 500hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	-40℃,500hours	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	+60℃, RH= 90% max 240hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30min~85℃ 30min ; 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 (Non-operation)	1G Waveform: sinusoidal Frequency range: 5~500Hz Frequency sweep rate: 0.5 octave/mim Duration: one sweep from 5 to 500Hz in each of three mutually perpendicular axis(each x,y,z axis:1hour,total 3hrs）	IEC60068-2-6:2007 GB/T 2423.10-2019
9	Shock Test (Non-operation)	Half Sine Wave 60G 2ms, ±X, ±Y, ±Z 2times for each direction	IEC60068-2-27:2008 GB/T 2423.5-2019
10	Package Drop Test	Weight≤10Kg，Height:80cm; Weight＞10Kg,，Height:60cm; 1corner,3edges,6surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

Note1: Ta is the ambient temperature of sample.
Note2: Before cosmetic and function test, the product must have enough recovery time, at least 2 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 only guarantees operation, but don't guarantee all of the cosmetic specification.

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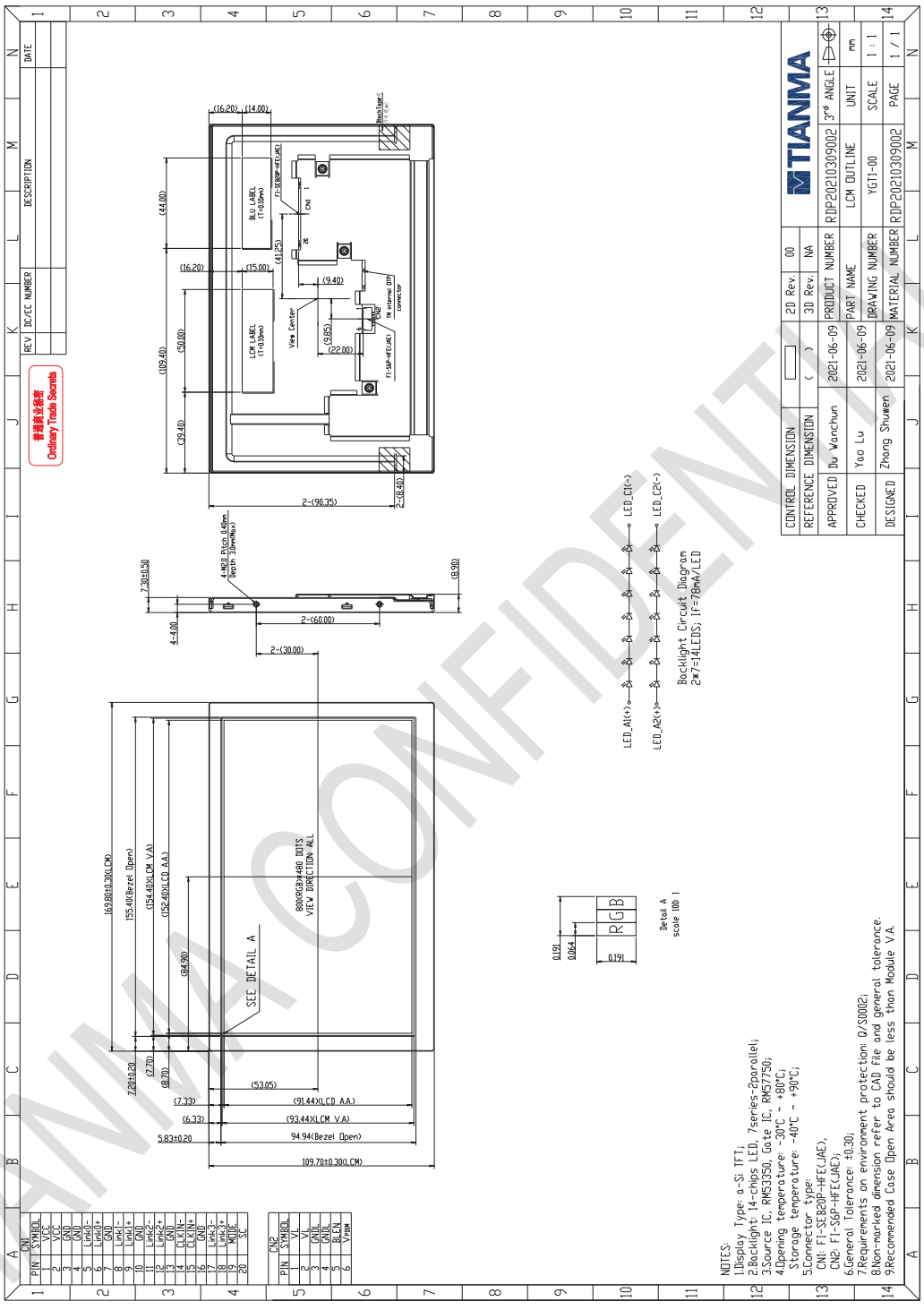
8 Mechanical Drawing



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9 Packing Drawing

(如果客户对标签或 Label 有特殊要求，请注明)

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10 Precautions for Use of LCD Modules

10.1 Handling Precautions

10.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

10.1.2 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.

10.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

10.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

10.1.5 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 alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the
following:

- Water
- Ketone
- Aromatic solvents

10.1.6 Do not attempt to disassemble the LCD Module.

10.1.7 If the logic circuit power is off, do not apply the input signals.

10.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1 Be sure to ground the body when handling the LCD Modules.

10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4 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.

10.2 Storage precautions

10.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

10.2.2 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%

10.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

10.3 Transportation Precautions

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

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