TFT LCD Module

Approval Specification

Model No. ST101WXLDN4

Customer Name : _____

Part No. : _____

Approved By : _____

Approved Date : _____

Approved By	Checked By
Arnold Hsiao	Kent Wu

REVISION HISTORY

Revision Date	Page	Contents	Editor
2013/11/04	--	Preliminary Release	
2014/03/30	20	Modify mechanical design	Felix
2014/04/28	20	Replace FOG from HE101NA-02C to EE101IA-01G	Felix

Content

1. General Description

No.	Item	Specification	Remark
1	LCD size	10.1 inch (Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1280 X 3(R.G.B) x 800	
4	Display mode	Normally Black, Transmissive	
5	Dot pitch	0.0565(W) × 0.1695(H) mm	
6	Active area	216.96(W) × 135.6(H) mm	
7	Module size	229.46W) ×149.1(H) ×4.7(D) mm	Note1
11	Surface treatment	Hard coating, 3H	
12	Color arrangement	RGB-stripe	
13	Interface	LVDS	
14	Backlight power consumption	2.4W(Typ.)	
15	Panel power consumption	1.0W(Typ.)	
16	Weight	150g±5%	

Note1: Please refer to mechanical drawing.

2. PIN Assignment

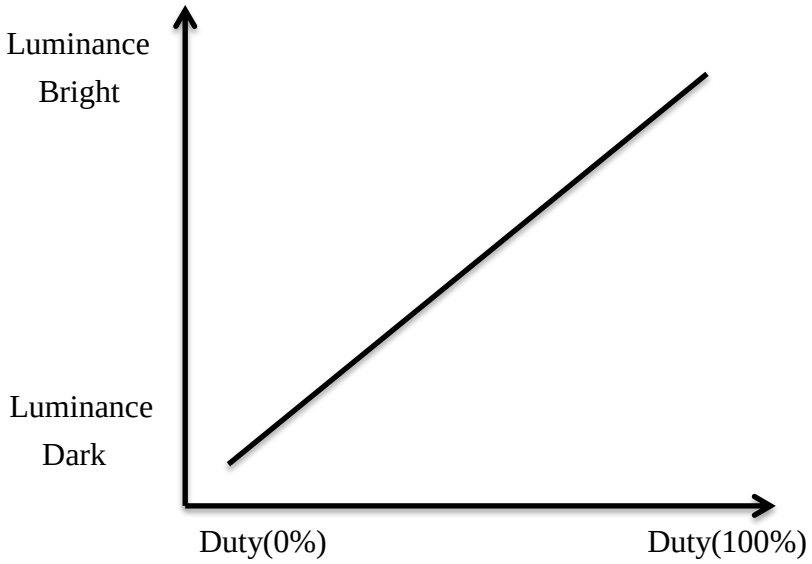
User connector: F62240-H1210A manufactured by Vigorconn.

Pin No.	Symbol	Description	Remark
1	VCOM	-LVDS differential data input	
2	VDD	Power Voltage for digital circuit	
3	VDD	Power Voltage for digital circuit	
4	NC	No connection	
5	NC	No connection	
6	NC	No connection	
7	GND	Power ground	
8	RXIN0-	-LVDS differential data input	R0~R5, G0
9	RXIN0+	+LVDS differential data input	
10	GND	Power ground	
11	RXIN1-	-LVDS differential data input	G1~G5, B0~B1
12	RXIN1+	+LVDS differential data input	
13	GND	Power ground	
14	RXIN2-	-LVDS differential data input	B2~B5, HS, VS, DE
15	RXIN2+	+LVDS differential data input	
16	GND	Power ground	
17	RXCLK-	-LVDS differential clock input	LVDS Clock
18	RXCLK+	+LVDS differential clock input	
19	GND	Power ground	
20	RXIN3-	-LVDS differential data input	R6,R7,G6, G7,B6,B7
21	RXIN3+	+LVDS differential data input	
22	GND	Power ground	
23	NC	No connection	
24	NC	No connection	
25	GND	Power ground	
26	NC	No connection	
27	LED_PWM	CABC controller signal output for backlight	Note2
28	NC	No connection	
29	AVDD	Power for Analog Circuit	
30	GND	Power ground	
31	LED-	LED Cathode	
32	LED-	LED Cathode	
33	NC	No connection	
34	NC	No connection	
35	VGL	Gate OFF Voltage	
36	NC	No connection	
37	CABC_EN	CABC H/W enable	Note1
38	VGH	Gate ON Voltage	
39	LED+	LED Anode	
40	LED+	LED Anode	

Note1: The settings of CABC function are as follows.

Pin	Enable	Disable
CABC_EN	High voltage	Low voltage or open

Note2: LED_PWM is used to adjust backlight brightness.



Note3: ST101WXLDN4 supports only 24bits input.

3. Operation Specifications

3.1 Absolute Maximum Ratings

Item	Symbol	Values(Note1)		Unit	Remark
		Min.	Max.		
Power voltage	DV_{DD}	-0.3	3.9	V	
	AV_{DD}	-0.3	14	V	
	V_{GH}	-0.3	42.0	V	
	V_{GL}	-19	0.3	V	
	V_{GH}-V_{GL}	12	40	V	
Operation temp.	T_{OP}	0	50	℃	
Storage temp.	T_{ST}	-20	60	℃	

Note1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

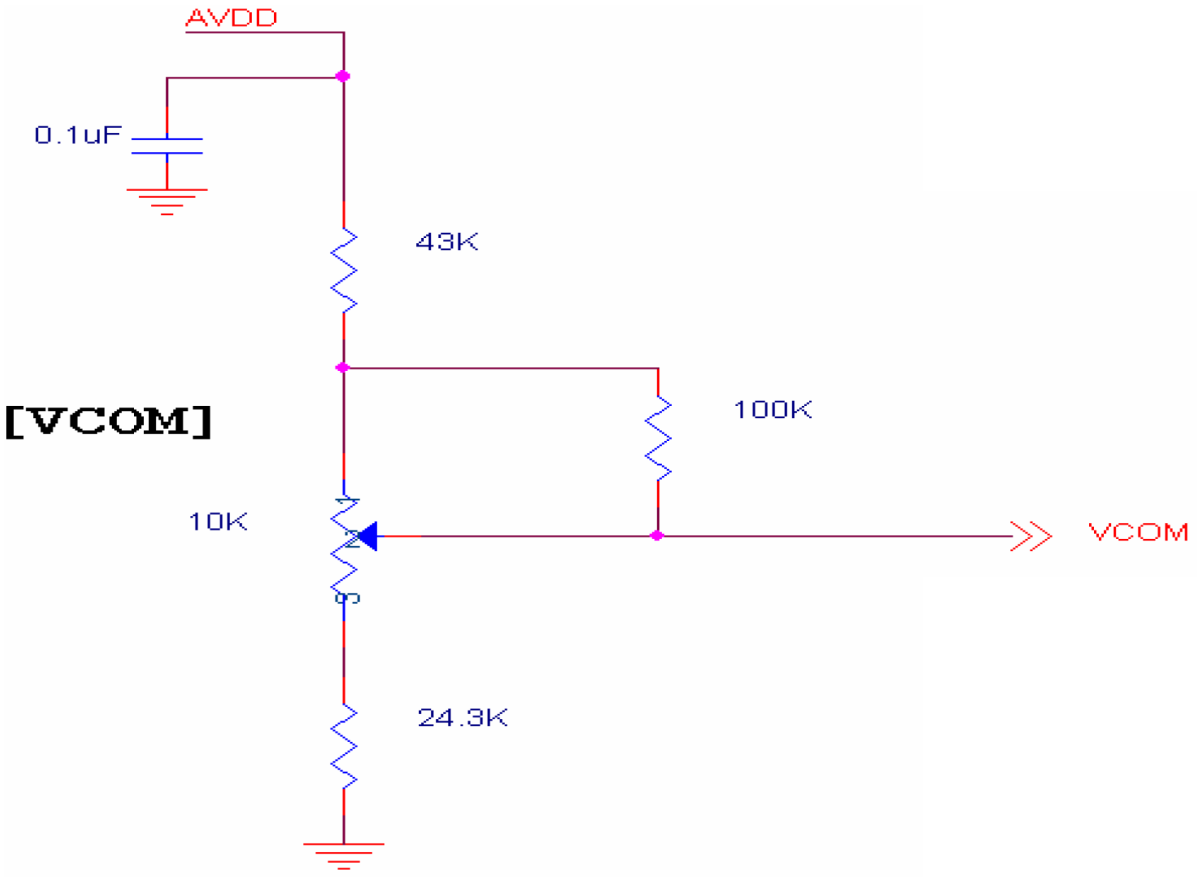
3.1.1 Typical Operation Conditions

Item	Symbol	Values(Note1)			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	DV_{DD}	2.3	2.5	2.7	V	Note2
	AV_{DD}	8.0	8.2	8.4	V	
	V_{GH}	21.7	22	22.3	V	
	V_{GL}	-7.3	-7	-6,7	V	
Input signal voltage	V_{COM}	3.0	3.3	3.6	V	
Input logic high voltage	V_{IH}	0.8 DV_{DD}		DV_{DD}	V	Note3
Input logic low voltage	V_{IL}	0		0.2 DV_{DD}	V	

Note1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.

Note2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note4: Typical V_{COM} is only a reference value, it must be optimized according to each LCM. Be sure to use VR.


AVDD
0.1uF
43K
[VCOM]
100K
10K
VCOM
24.3K

3.1.2 Backlight Driving Conditions

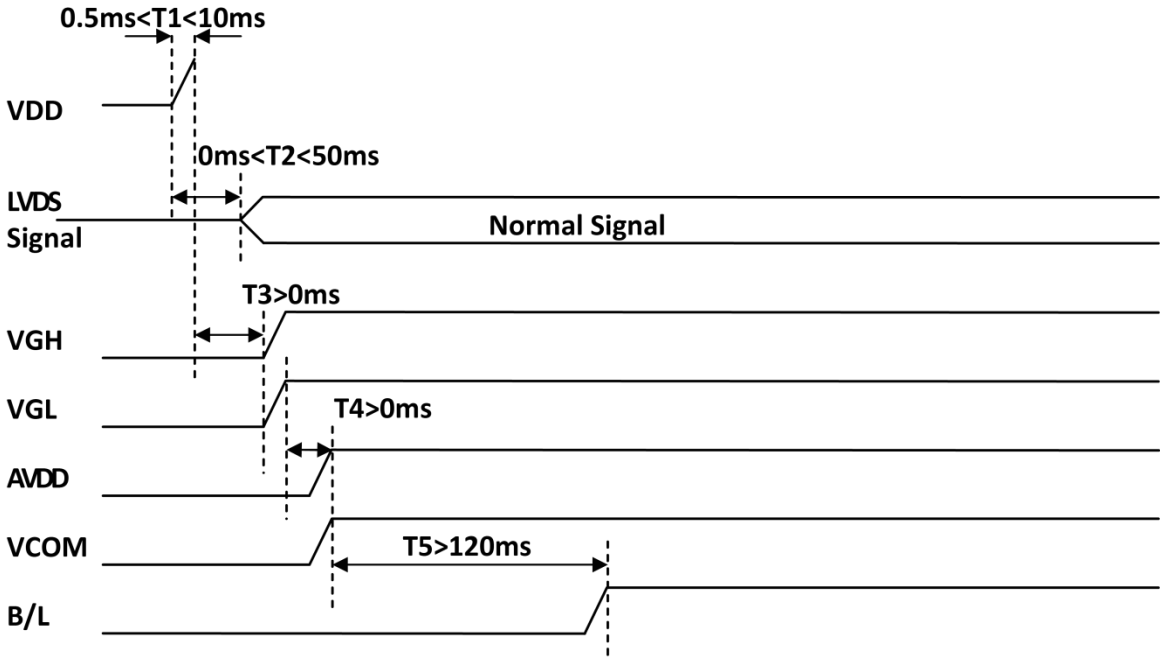
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	VL	21	24	27	V	Note1
Current for LED backlight	IL	80	100	120	mA	
LED life time	-	-	20,000		Hr	Note2

Note1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and I_L =100mA.

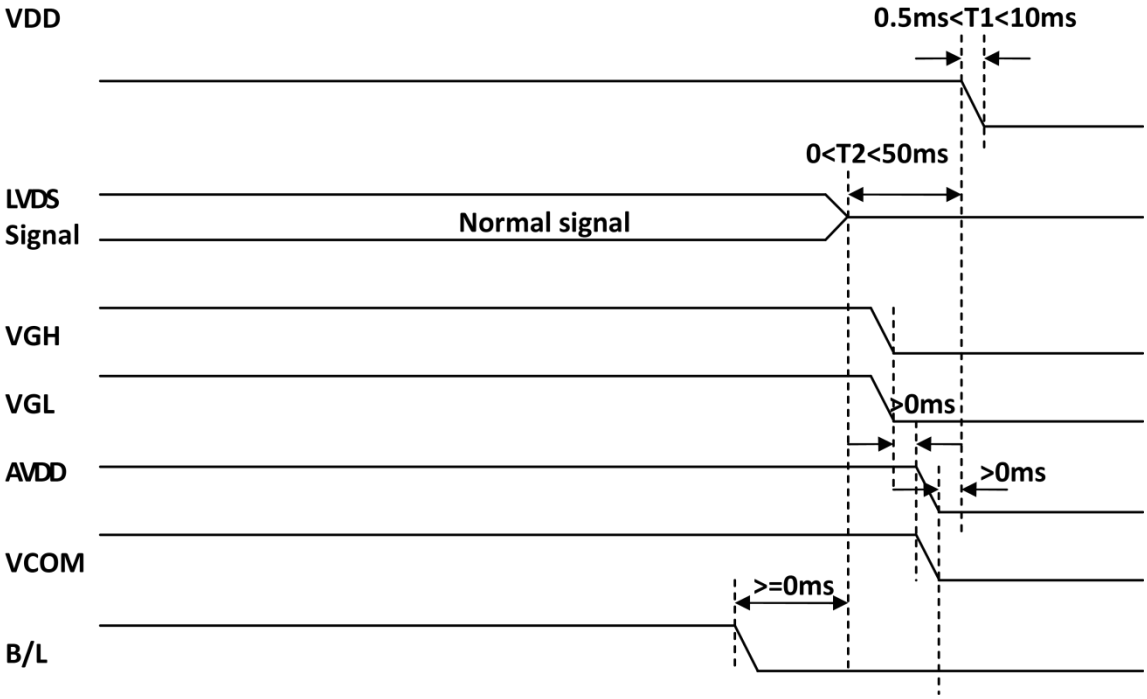
Note2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_L =100mA. The LED lifetime could be decreased if operating I_L is larger than 100mA.

3.2 Power Sequence

a. Power on



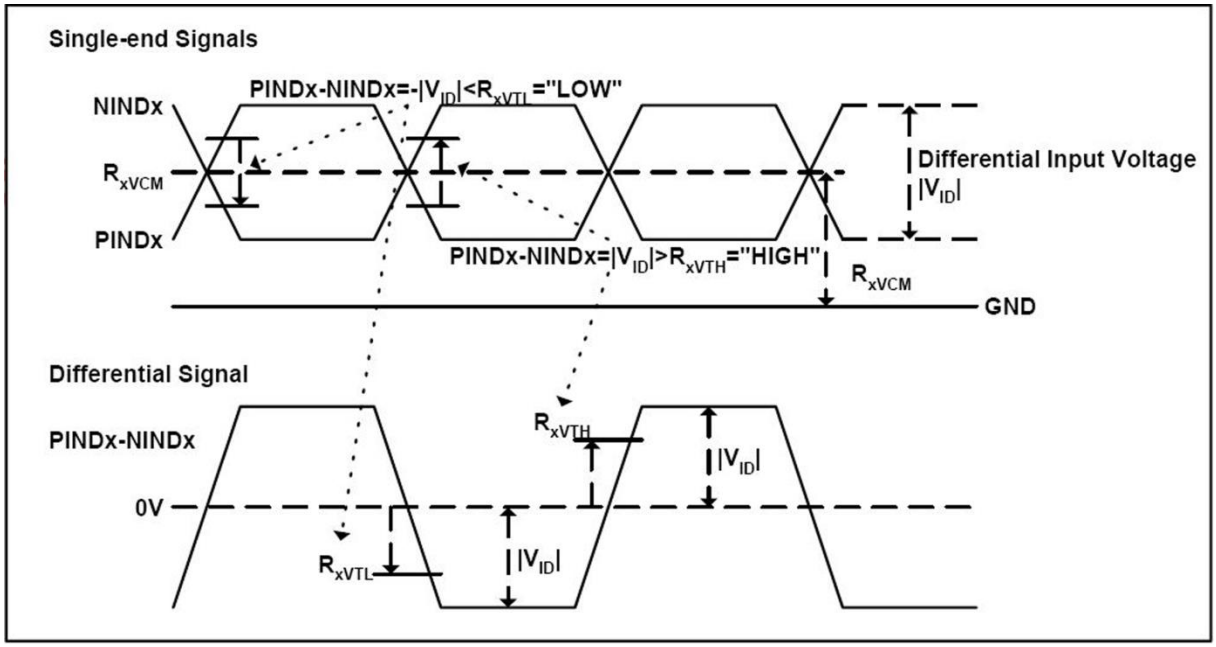
b. Power off



3.3 LVDS Signal Timing Characteristics

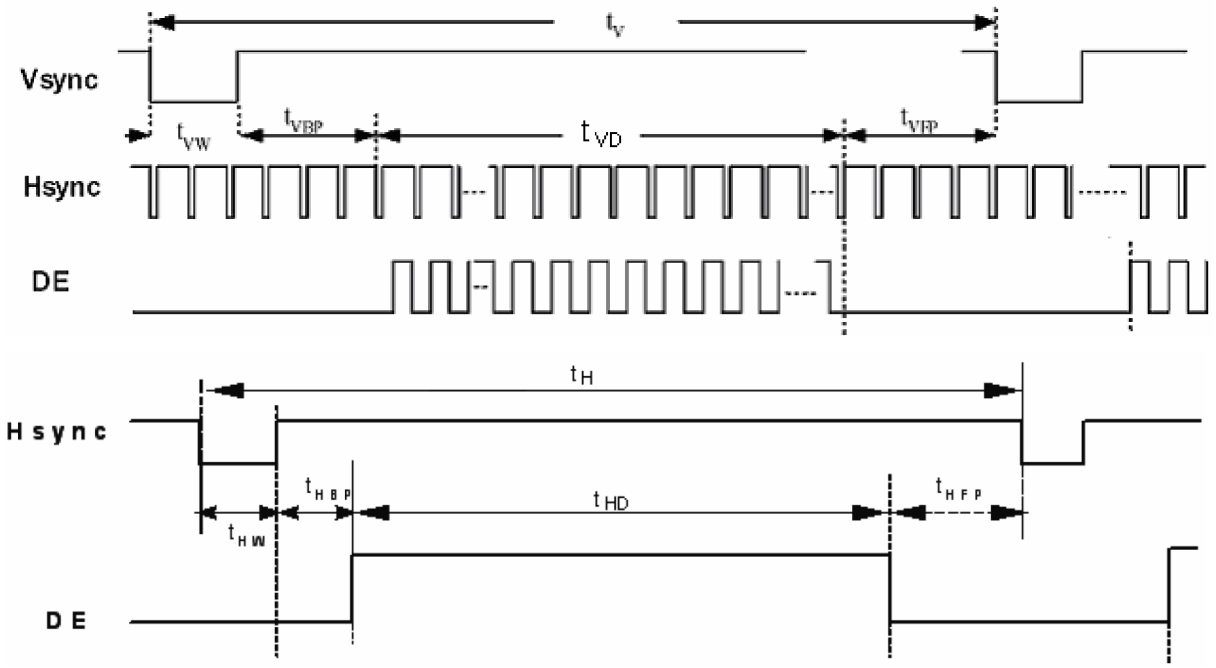
3.3.1 AC Electrical Characteristics

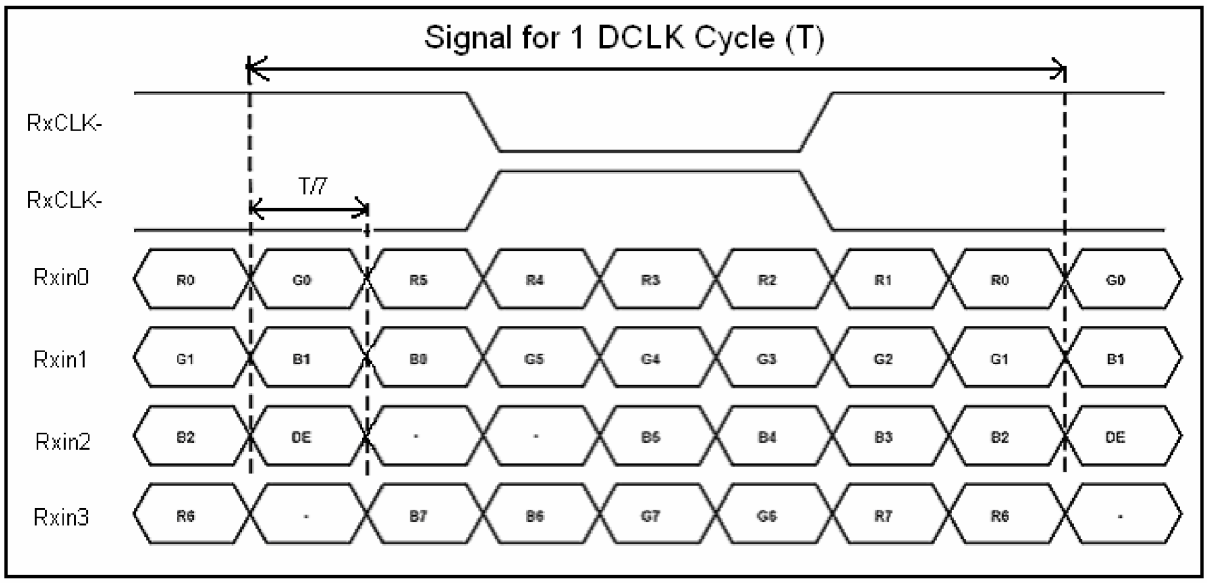
Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{xVTH}	-	-	+100	mV	R_{xVCM}=1.2V
LVDS Differential input low Threshold voltage	R_{xVTL}	-100	-	-	mV	
LVDS Differential input common mode voltage	R_{xVCM}	0.7	-	1.6	V	
LVDS Differential voltage	$\|V_{ID}\|$	100	-	600	mV	



3.3.2 Timing table

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	(68.9)	71.1	(73.4)	MHz	Frame rate =60Hz
Horizontal display area	thd		1280		Tc	
HS period time	th	(1410)	1440	(1470)	Tc	
HS Width +Back Porch +Front Porch	tHW+ tHBP +tHFP	(60)	160	(190)	Tc	
Vertical display area	tvd		800		tH	
VS period time	tv	(815)	823	(833)	tH	
VS Width +Back Porch +Front Porch	tvW+ tvBP +tvFP	(15)	23	(33)	tH	




Signal for 1 DCLK Cycle (T)
RxCLK-
RxCLK-
T/7
Rxin0
R0
G0
R5
R4
R3
R2
R1
R0
G0
Rxin1
G1
B1
B0
G5
G4
G3
G2
G1
B1
Rxin2
B2
DE
-
-
B5
B4
B3
B2
DE
Rxin3
R6
-
B7
B6
G7
G6
R7
R6
-

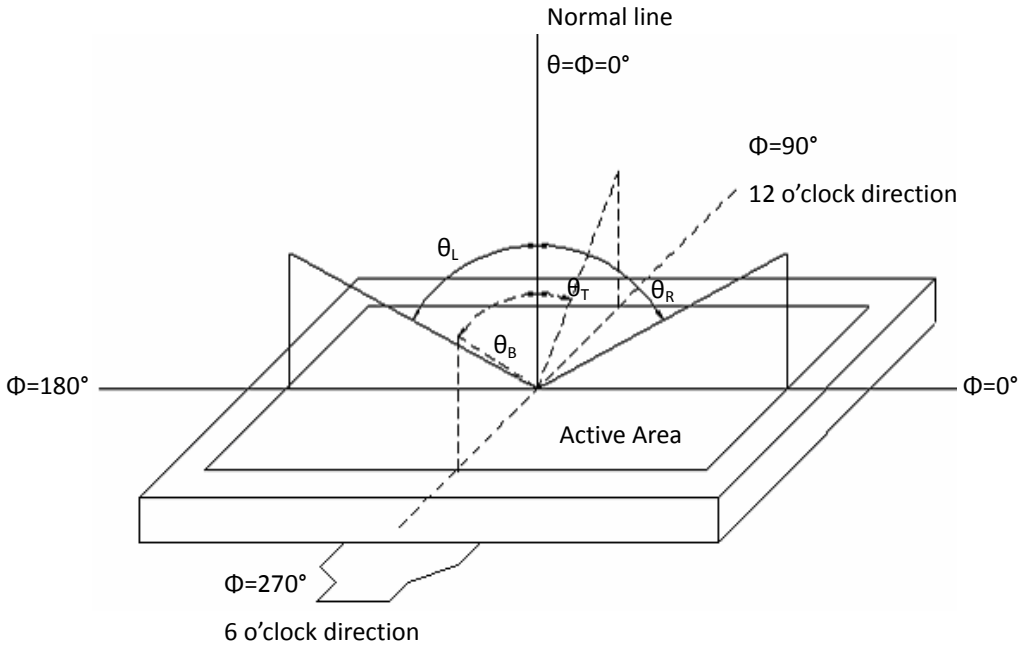
4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≧10)	θ_L	Φ=180°(9 o'clock)	75	85	-	degree	Note1
	θ_R	Φ=0°(3 o'clock)	75	85	-		
	θ_T	Φ=90°(12 o'clock)	75	85	-		
	θ_B	Φ=270°(6 o'clock)	75	85	-		
Response time	T_{ON}	Normal θ=Φ=0°	-	10	20	msec	Note3
	T_{OFF}		-	15	30	msec	Note3
Contrast ratio	CR		600	800	-	-	Note4
Color chromatically	W_X		0.26	0.31	0.36	-	Note2 Note5 Note6
	W_Y		0.28	0.33	0.38	-	
Luminance	L		320	400	-	cd/m^2	Note6
Luminance uniformity	Y_u		70	75	-	%	Note6

Test Conditions:

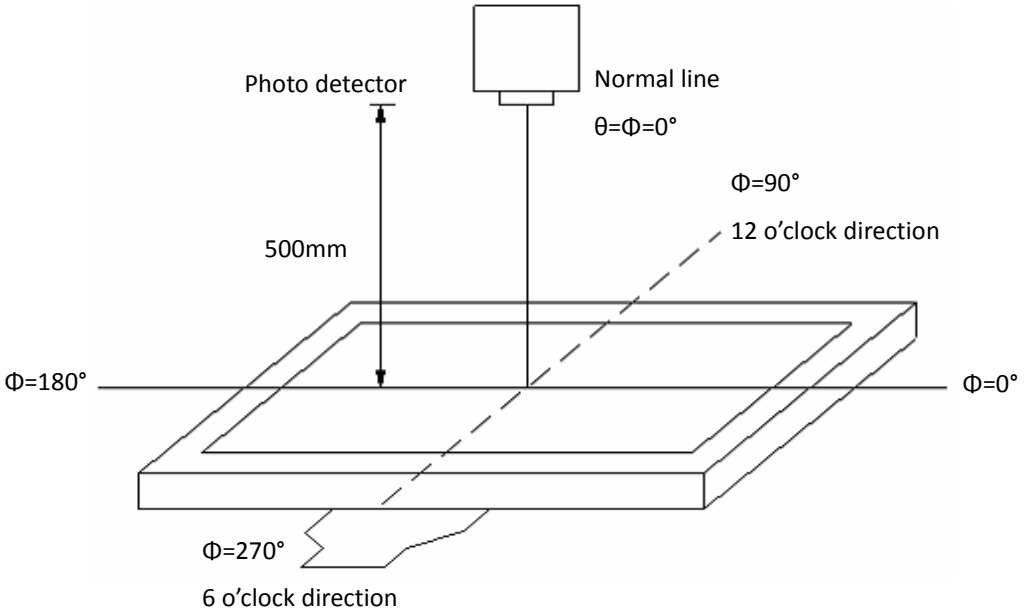
1. DV_{DD}=3.3V, I_L=100mA (Backlight current), the ambient temperature is 25℃.
2. The test systems refer to Note 5.

Note1: Definition of viewing angle



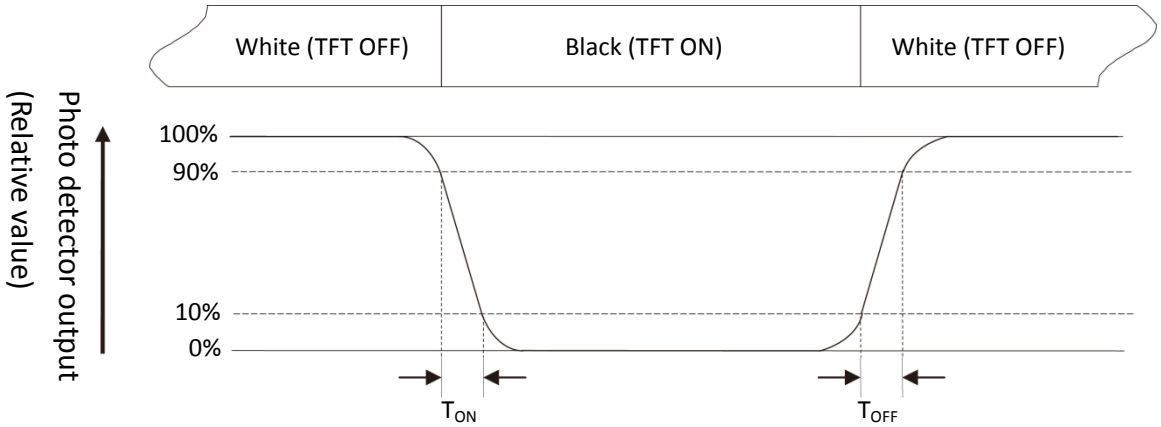
Note2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)



Note3: 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%.



Note4: Definition of contrast ratio

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

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is IL=100mA.

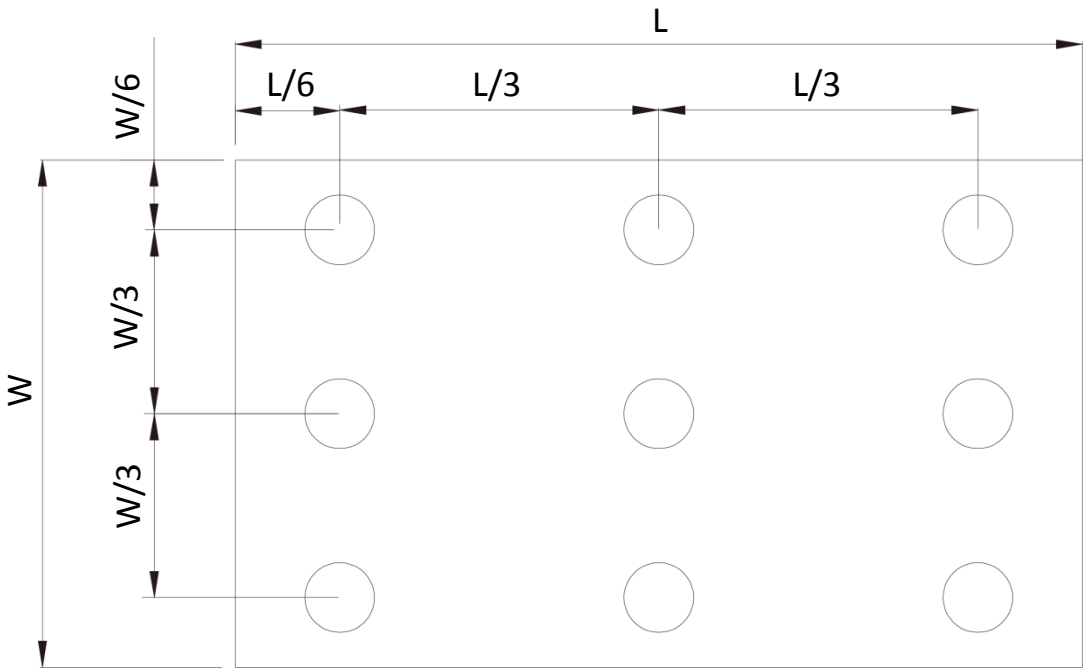
Note7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to below graphic).

Every measuring point is placed at the center of each measuring area.

$$Luminance\ Uniformity(Yu) = \frac{Bmin}{Bmax}$$

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



B_{max}: The measured maximum luminance of all measurement position.

B_{min}: The measured minimum luminance of all measurement position.

5. Reliability Test Items

Item	Test Conditions(Note3)	Remark
High Temperature Storage	Ta = 60℃, 240hrs	Note1, Note4
Low Temperature Storage	Ta = -20℃, 240hrs	Note1, Note4
High Temperature Operation	Ts = 50℃, 240hrs	Note2, Note4
Low Temperature Operation	Ta = 0℃, 240hrs	Note1, Note4
Operate at High Temperature and Humidity	+40℃, 90%RH, 240hrs	Note4
Thermal Shock	-20℃/30 min ~ +60℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note4
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)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note1: Ta is the ambient temperature of samples.

Note2: Ts is the temperature of panel's surface.

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.

Note4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

6. General Precautions

6.1 Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2 Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

6.3 Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

6.4 Storage

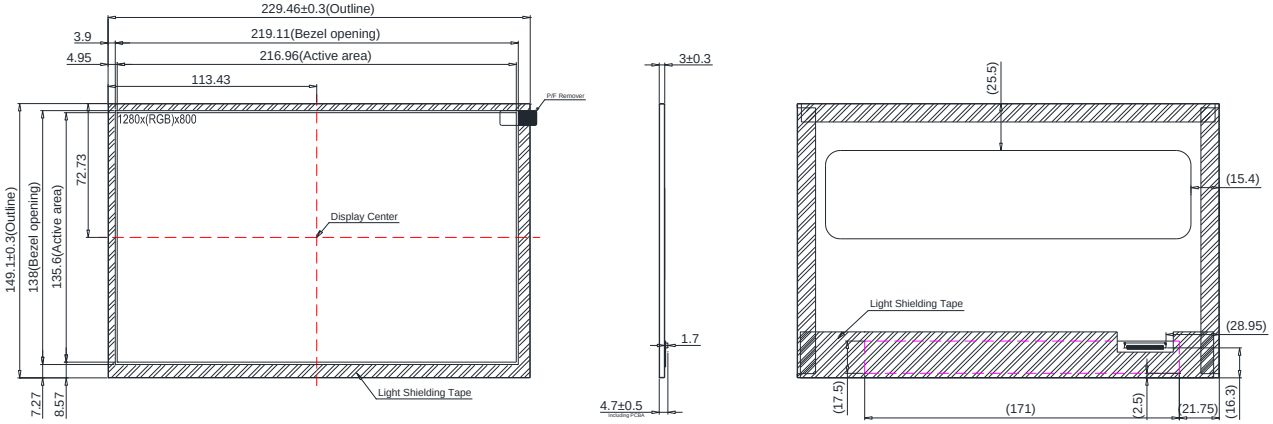
1. Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

6.5 Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

7. Mechanical Drawing

REV No.	Reviser	Date	Description



User Connector Pin Assignment							
PIN1	VCOM	PIN11	RXIN1-	PIN21	RXIN3+	PIN31	LED-
PIN2	VDD	PIN12	RXIN1+	PIN22	GND	PIN32	LED-
PIN3	VDD	PIN13	GND	PIN23	NC	PIN33	NC
PIN4	NC	PIN14	RXIN2-	PIN24	NC	PIN34	NC
PIN5	NC	PIN15	RXIN2+	PIN25	GND	PIN35	VGL
PIN6	NC	PIN16	GND	PIN26	NC	PIN36	NC
PIN7	GND	PIN17	RXCLK-	PIN27	LED_PWM	PIN37	CABC_EN
PIN8	RXIN0-	PIN18	RXCLK+	PIN28	NC	PIN38	VGH
PIN9	RXIN0+	PIN19	GND	PIN29	AVDD	PIN39	LED+
PIN10	GND	PIN20	RXIN3-	PIN30	GND	PIN40	LED+

Note:
1.User connector:F62240-H1210A manufactured by Vigorconn.
2.General tolerance is ±0.3.
3.This panel has no solid hood, please handle it carefully.

UNLESS OTHERWISE SPECIFIED DIMENSION ARE IN MILLIMETERS TOLERANCE ARE : FRACTION DECIMALS ANGLES	SUNIVERSE-TECH	PART NO.	LCM101130421-04
.X ±0.3 .XX ±0.1 .XXX ±0.05 X° ±2.0° .X° ±1.0° .XX° ±0.5°	APPROVALS / DATE	PART NAME	ST101WXLDN4
3rd ANGLE PROJECTION	DRAWN Kent Wu	LEAD-FREE	MATERIAL
	CHECKED Arnold Hsiao	HALOGEN-FREE	SIZE / SCALE 1 : 1 / SHEET / VERSION
	APPROVED		