



晶采光電科技股份有限公司
AMPIRE CO., LTD.

Specifications for LCD module

Customer	
Customer part no.	
Ampire part no.	AM-1280720LTZQW-00H
Approved by	
Date	

- Preliminary Specification
- Formal Specification

AMPIRE CO., LTD.

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Approved by	Checked by	Organized by
Patrick	Jessica	Mantle

This Specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2020/01/09	---	New Release	Mantle

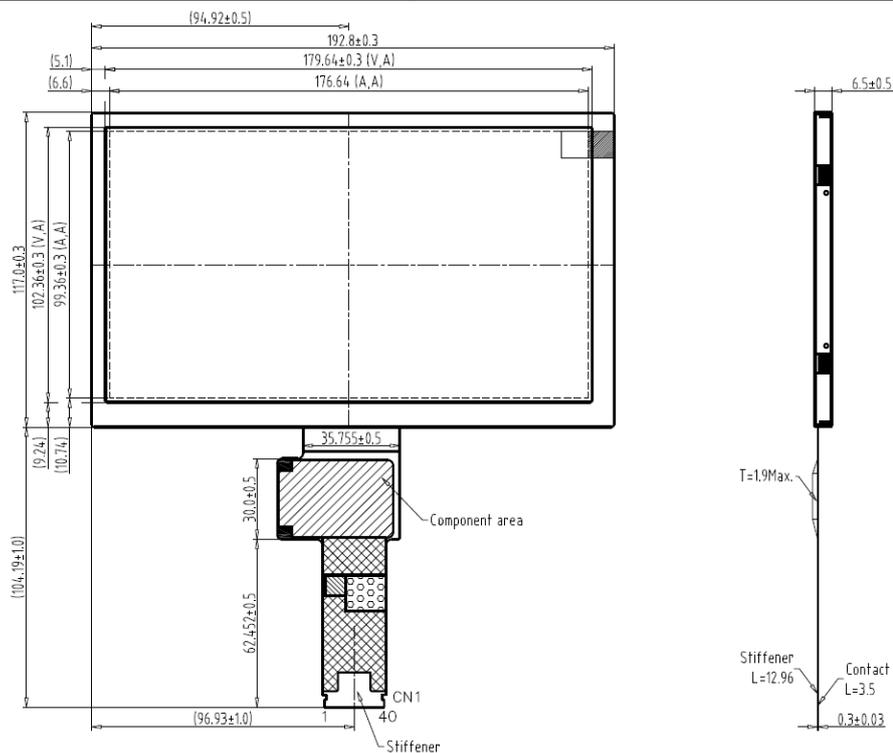
1. Features

8 inch is color active matrix liquid crystal display. It uses a-Si Thin Film Transistor as a switching device. This TFT LCD has an 8 inch diagonally measured active display area with 1280x720 (1280 horizontal by 720 vertical pixels) resolutions. This module is composed of an 8" TFT-LCD panel and backlight unit.

- (1) Construction: a-Si TFT-LCD with driving system, White LED Backlight.
- (2) LCD type : IPS
- (3) Number of the Colors : 16.7M colors (R,G,B 8bit digital each)
- (4) Interface: LVDS
- (5) LCD Power Supply Voltage: 3.3V single power input, built-in power supply circuit.

2. Physical Specifications

Item	Specifications	unit
Display size (diagonal)	8.0	inch
Resolution	1280 (W) x RGB x 720 (H)	dot
Pixel pitch	0.1380 (W) x 0.1380 (H)	mm
Color configuration	R.G.B Vertical stripe	
Display Mode	Normally Black	



3. Absolute Maximum Ratings

3.1 Electrical and Environmental Absolute max. ratings

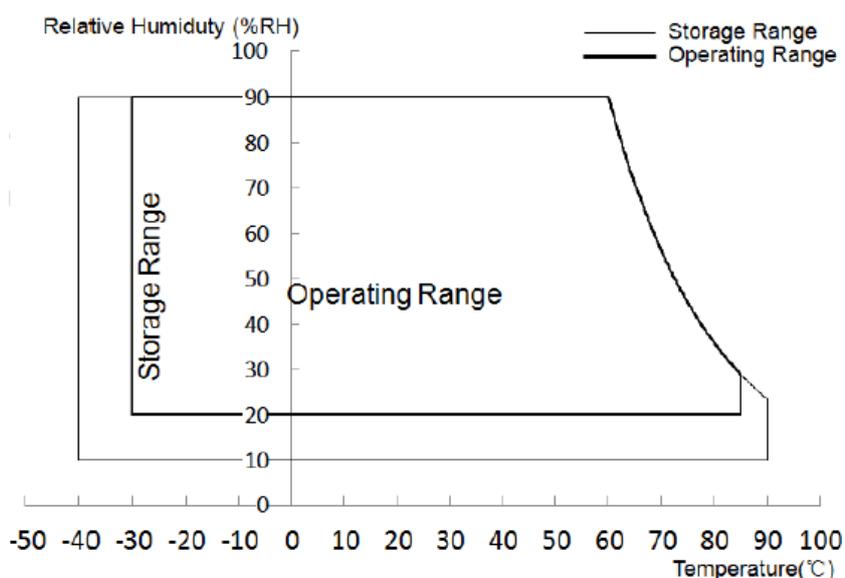
Item	Symbol	Condition	Min.	Max.	Unit	Remark
Logic Supply Voltage	VDD	GND=0	-0.3	4.0	V	Note (1)(2) (3)(4)
Logic Input Signal Voltage	VSIGNAL	GND=0	-0.3	VDD	V	
Operating Temperature	TOP	--	-30	85	°C	
Storage Temperature	TSTG	--	-40	90	°C	

Note(1) All the parameters specified in the table are absolute maximum rating values that may cause faulty operation or unrecoverable damage, if exceeded. It is recommended to follow the typical value.

Note(2) All the contents of electro-optical specifications and display fineness are guaranteed under Normal Conditions. All the display fineness should be inspected under normal conditions. Normal conditions are defined as follow: Temperature: 25 °C, Humidity: 55± 10%RH.

Note(3) Unpredictable results may occur when it was used in extreme conditions. TSTG= Ambient Temperature, TOP = Glass Surface Temperature. All the display fineness should be inspected under normal conditions.

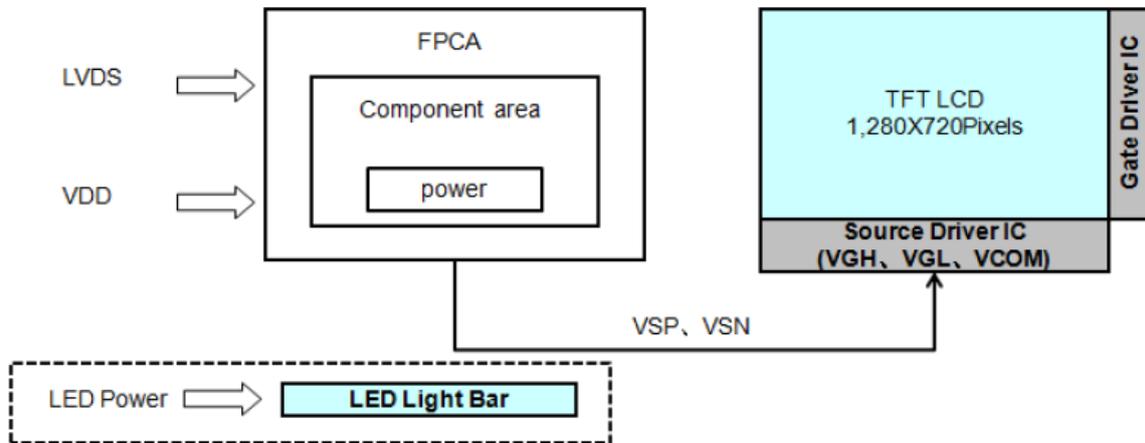
Note(4) Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be lower than 57.8°C, and no condensation of water. Besides, protect the module from static electricity.



Absolute Ratings of Environment of the LCD Module

4. Functional Block Diagram

It shows the functional block diagram of the LCD module.



5. Pixel Mapping

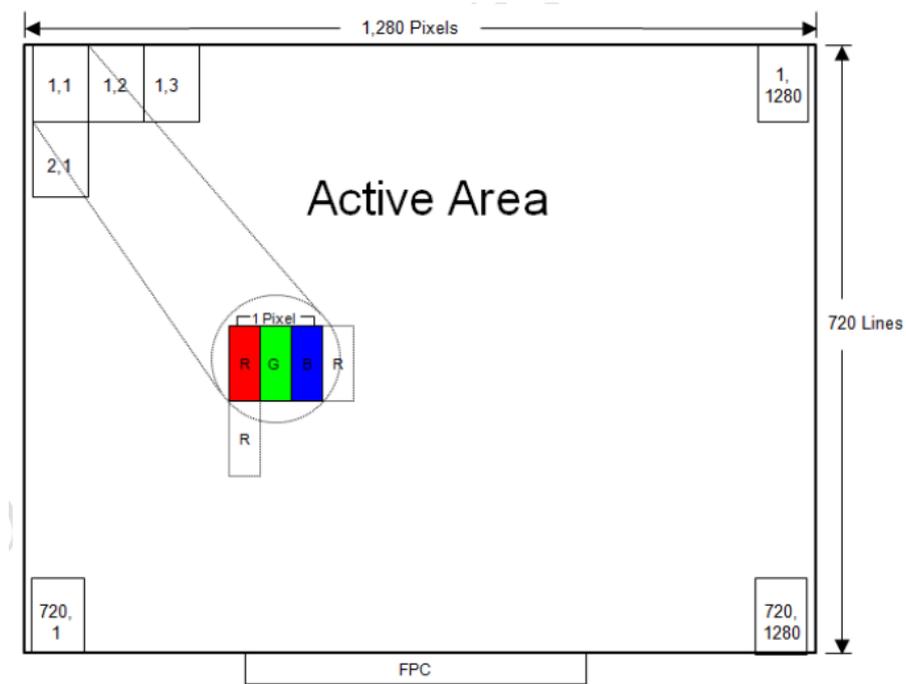


Figure2 Pixel Mapping

6. Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Horizontal	θ_{x+}	$CR \geq 10$	80	85	--	deg.	(1),(2) (3),(4)
		θ_{x-}		80	85	--		
	Vertical	θ_{y+}		80	85	--		
		θ_{y-}		80	85	--		
Contrast ratio		CR	$\theta_x = \theta_y = 0^\circ$	800	900	--	--	(1),(2),(4)
Response Time		$T_R + T_F$	$\theta_x = \theta_y = 0^\circ$	--	--	35	msec	(1),(2),(5)
NTSC		(%)		70	75	--	%	
Color chromaticity	Red	R _x	$\Theta = \Phi = 0^\circ$	Typ. -0.05	0.664	Typ. +0.05	--	(1),(4),(5)
		R _y			0.328			
	Green	G _x			0.253			
		G _y			0.601			
	Blue	B _x			0.138			
		B _y			0.093			
	White	W _x			0.299			
		W _y			0.323			
Luminance ($I_{AK} = 285mA$)		L	$\Theta = \Phi = 0^\circ$	640	800	--	cd/m ²	(1),(6)
Luminance Uniformity		ΔL	$\Theta = \Phi = 0^\circ$	70	-	-	%	(7)

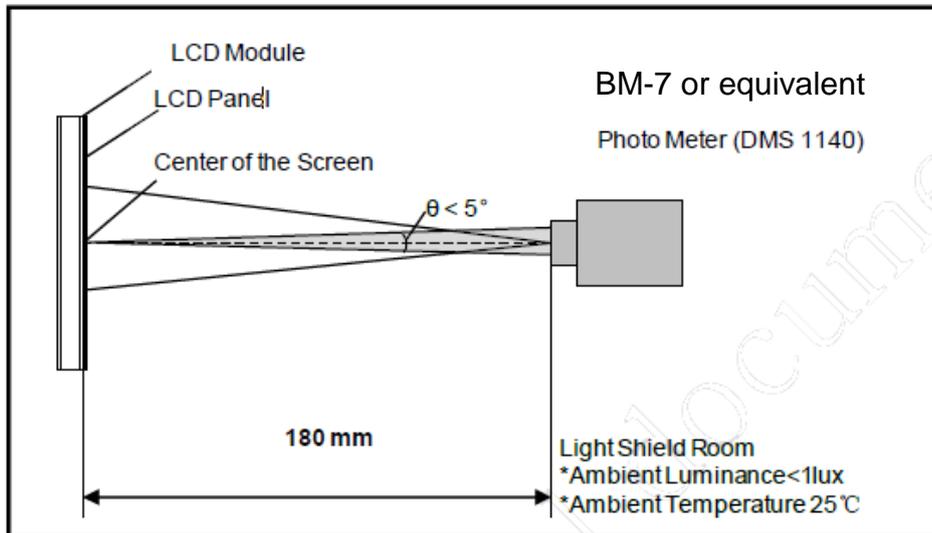
Measuring Condition

$T_a = 25^\circ C$. To be measured on the center area of panel after 10 minutes operation. LED Back-light $I_{AK} = 285mA$.

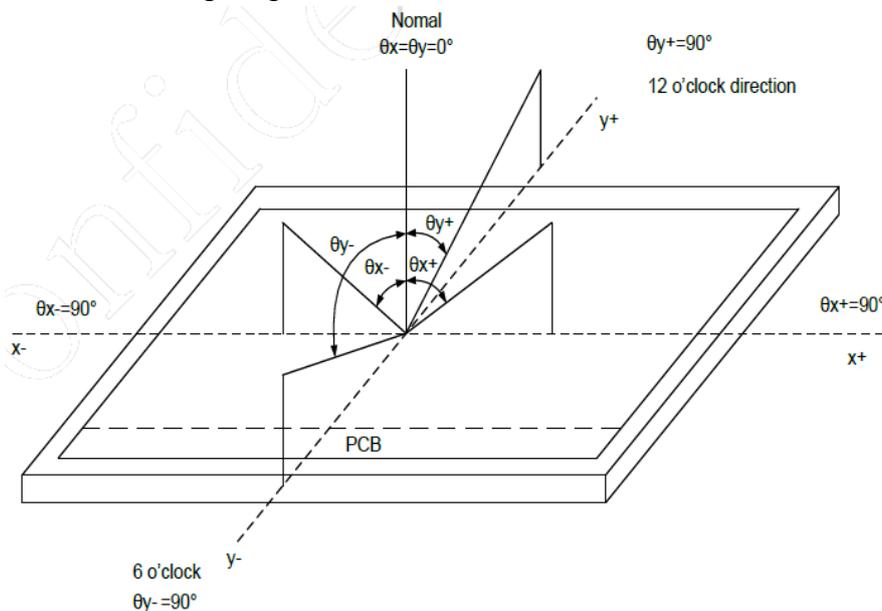
- Measuring surrounding : Dark room
- Ambient temperature : $25 \pm 2^\circ C$
- 15min. Warm-up time.

Note(1) Measurement Setup

The LCD module should be stabilized at given ambient temperature (25°C) for 30 minutes to avoid abrupt temperature changing during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 30 minutes in the windless room.



Note(2) Definition of Viewing Angle

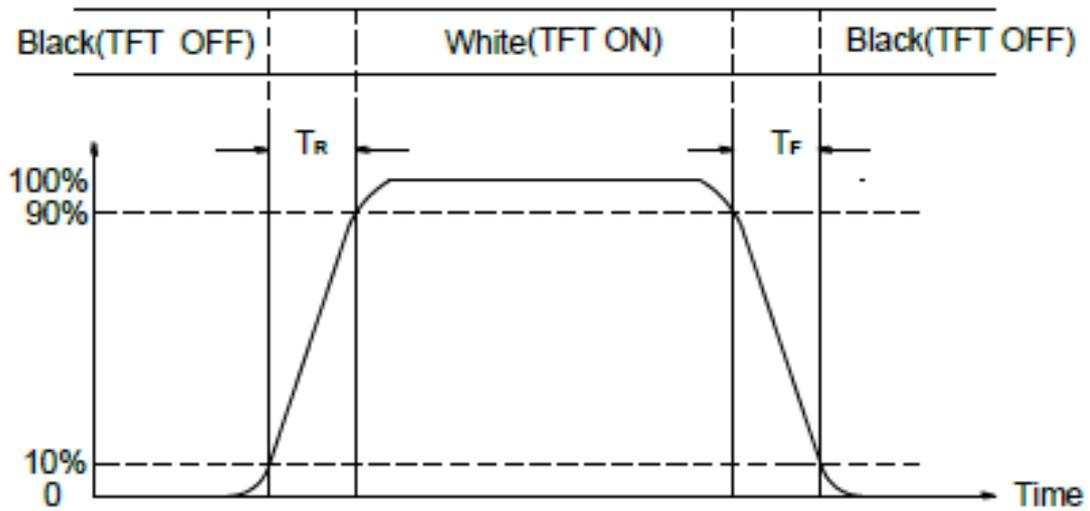


Note(3) Definition of Contrast Ratio (CR) :

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector Output when LCD is at "Black" state}}$$

Note(4) Definition of Response Time : Sum of TR and TF

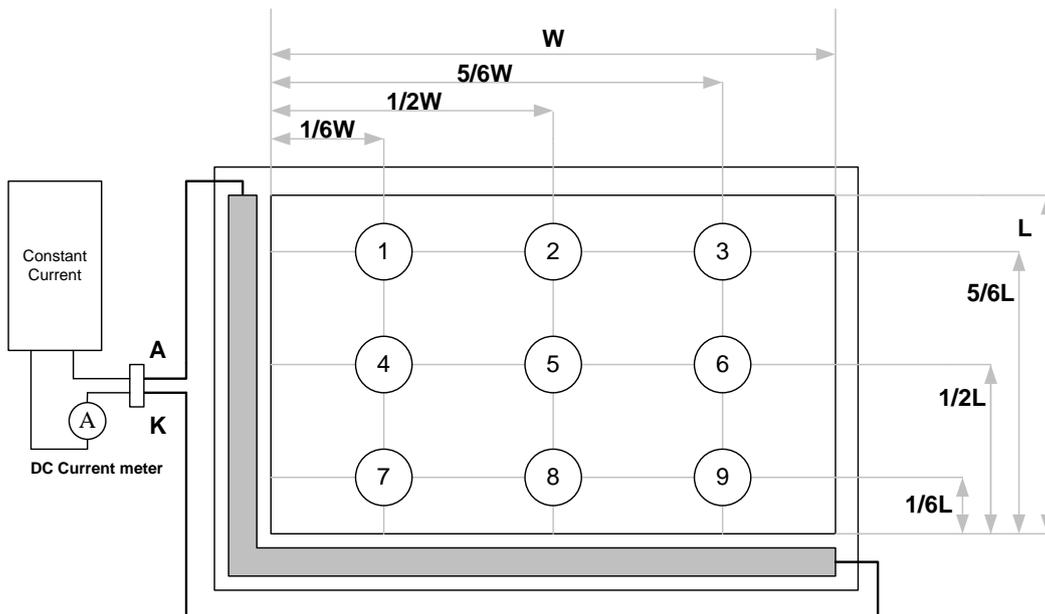


Note(5) Definition of color chromaticity (CIE1931)

Color coordinated measured at center point of LCD.

All input terminals LCD panel must be ground when measuring the center area of the panel.

Note(6) Luminance is measured at point 5 of the display.

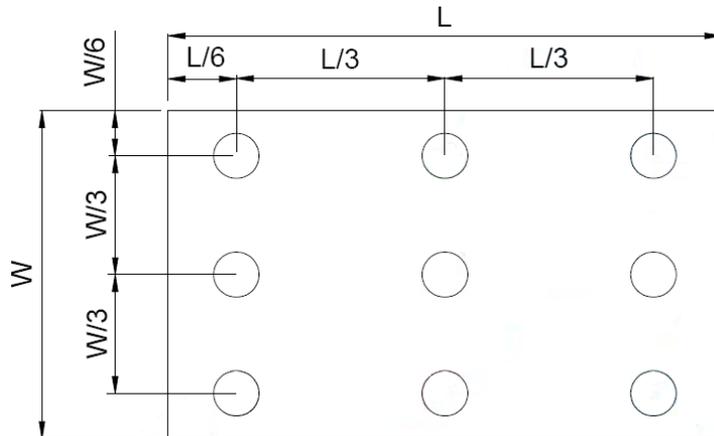


Note(7) Definition of Luminance Uniformity

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

$$\text{Luminance Uniformity (Yu)} = \frac{B_{\min}}{B_{\max}}$$

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.

7. Electrical Characteristics

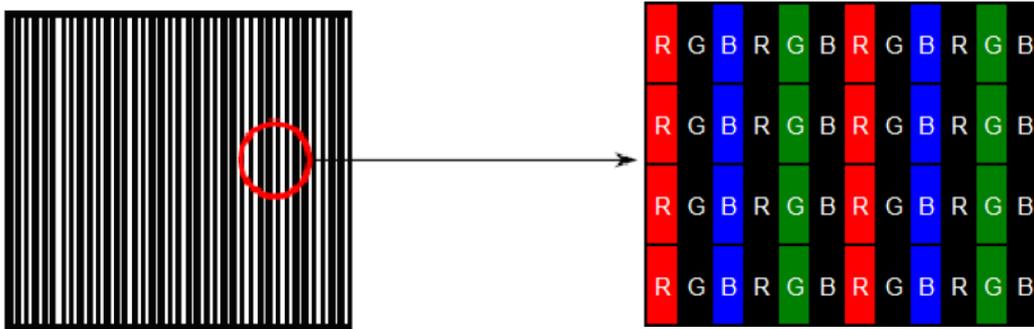
7.1 DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power supply voltage	VDD	3	3.3	3.6	V	(1),(2)
Power Supply current	IDD	--	--	188	mA	(1),(4)

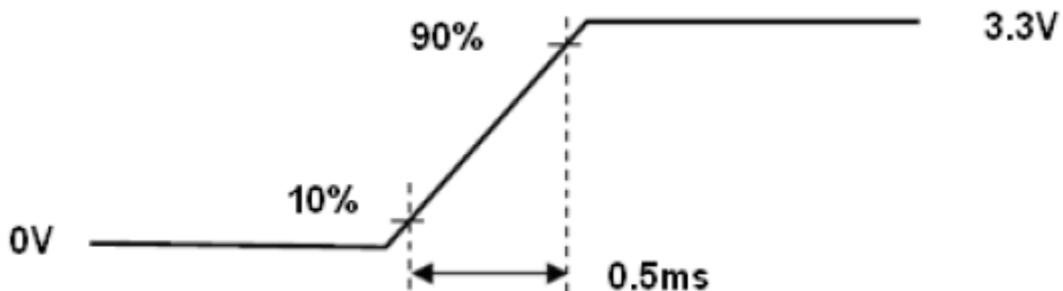
Note(1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: **Temperature: 25°C**, **Humidity: 55± 10%RH**.

Note(2) All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage. **It is recommended to follow the typical value*:**Will be reference only

Note(3) The specified VDD current and power consumption are measured under the VDD = 3.3 V, FV= 60 Hz condition and V-Stripe pattern.



Note(4) The figure below is the measuring condition of VDD. Rush current can be measured when TRUSH is 0.5ms.



VDD Rising Time

7.2 Electrical Characteristic Of LED Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Forward Voltage	VAK	19.0	21.5	24.5	V	I _{AK} =285mA, T _a =25°C
LED Forward Current	I _{AK}	--	285	--	mA	T _a =25°C
LED life time			50K	-	Hrs.	I _{AK} =285mA, T _a =25°C

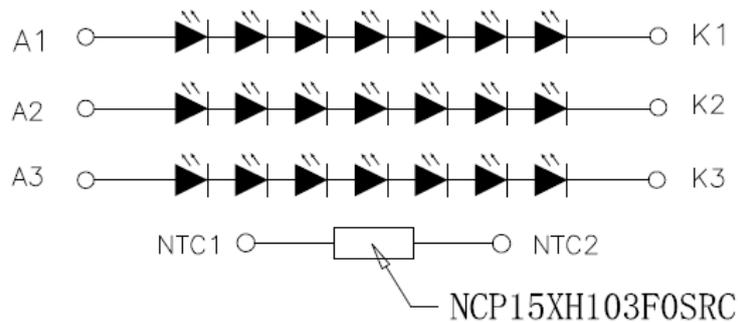
Note(1) T_a means ambient temperature of TFT-LCD module.

Note(2) If the module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

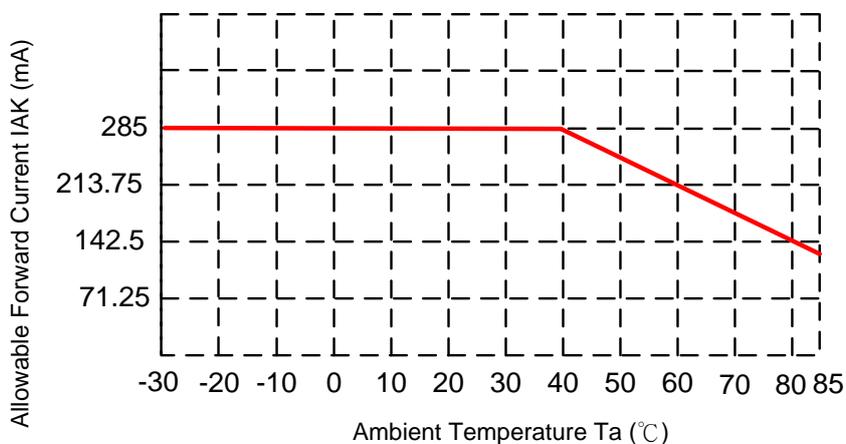
Note(3) The constant current source is needed for LED back-light driving.

Note(4) Operating life means brightness goes down to 50% minimum brightness. LED life time is estimated data. T_a=25°C

Note(5) The structure of LED B/L shows as below.



Note(6) When LCM is operated over 60°C ambient temperature, the I_{AK} of the LED backlight should be adjusted to 213.75mA max



8. Interface Pin Assignment

8.1 LCD

CN1 Connector: F31L-1A7H1-21040 or Equivalent

Pin No	Symbol	Function
1	NC/BIST	Internal test pin, dummy for normal mode. Pull high BIST mode. When it is not used, Connecting to GND is recommended, Don't floating
2	NC	No Connection
3	SHLR	Horizontal scan direction control. "H" Left to Right; "L" Right to Left. H:3.0V~3.6V; L:0V~0.4V
4	UPDN	Vertical scan direction control. "H" Down to Up; "L" Up to Down. H:3.0V~3.6V; L:0V~0.4V
5	VDD	System supply voltage. (3.3Vtyp.) 3.0V~3.6V current capacity>1.5A
6	NC	No Connection
7	GND	Ground
8	CLKP	Positive LVDS differential clock input.
9	CLKN	Negative LVDS differential clock input.
10	GND	Ground
11	PIND0	Positive LVDS differential input.
12	NIND0	Negative LVDS differential input.
13	GND	Ground
14	PIND1	Positive LVDS differential input.
15	NIND1	Negative LVDS differential input.
16	GND	Ground
17	PIND2	Positive LVDS differential input.
18	NIND2	Negative LVDS differential input.
19	GND	Ground
20	PIND3	Positive LVDS differential input.

21	NIND3	Negative LVDS differential input.
22	GND	Ground
23	NC	No Connection
24	VDD	System supply voltage. (3.3Vtyp.)3.0V~3.6V current capacity>1.5A
25	NC/VPP	No Connection
26	GND	Ground
27	NC/AVDD	No Connection
28	NC/AVDD	No Connection
29	NC	No Connection
30	NC/CSB	No Connection
31	NC/SCL	No Connection
32	NC//SDA	No Connection
33	NC/ATREN	No Connection
34	GND	Ground
35	NC	No Connection
36	NC/VGH	No Connection
37	NC	No Connection
38	NC/VGL	No Connection
39	NC	No Connection
40	NC	No Connection

Note(1) H : 3.0V~3.6V

Note(2) L/NC : 0~0.4V

SHLR	UPDN	Scan direction
H	H	Data scan from left to right; Gate scan from down to up
L	H	Data scan from right to left; Gate scan from down to up
H	L	Data scan from left to right; Gate scan from up to down
L	L	Data scan from right to left; Gate scan from up to down

8.2 Backlight

CN2 Connector: FH28-10S-0.5SH or Equivalent

Pin No	Symbol	Function
1	A1	Anode A1
2	A2	Anode A2
3	A3	Anode A3
4	NC	No Connection
5	NTC1	NTC1
6	NTC2	NTC2
7	NC	No Connection
8	K3	Cathode K3
9	K2	Cathode K2
10	K1	Cathode K1

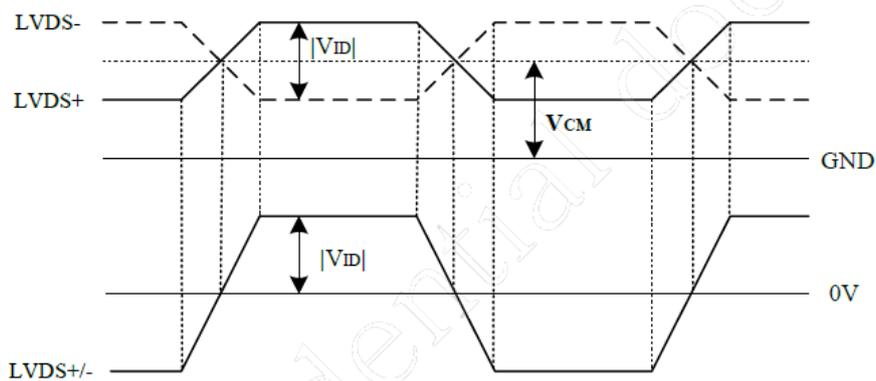
8.3 Signal Electrical Characteristics

8.4.1 Signal Electrical Characteristics For LVDS Receiver

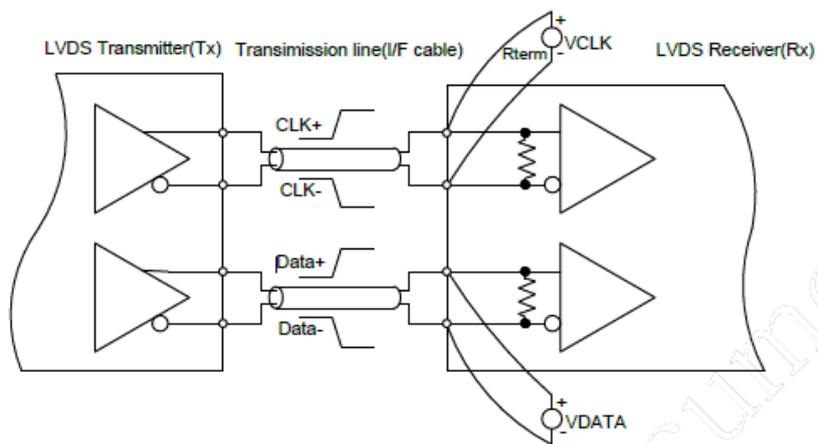
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth	-	-	(+100)	mV	VCM=+1.2V
Differential Input Low Threshold	Vtl	(-100)	-	-	mV	-
Magnitude Differential Input Voltage	VID	(100)	-	(600)	mV	-
Common Mode Voltage	VCM	(1)	(1.2)	$(1.7 - VID) / 2$	V	-

Note(1) Input signals shall be low or Hi- resistance state when VDD is off.

Note(2) All electrical characteristics for LVDS signal are defined and shall be measured red at the interface connector of LCD.



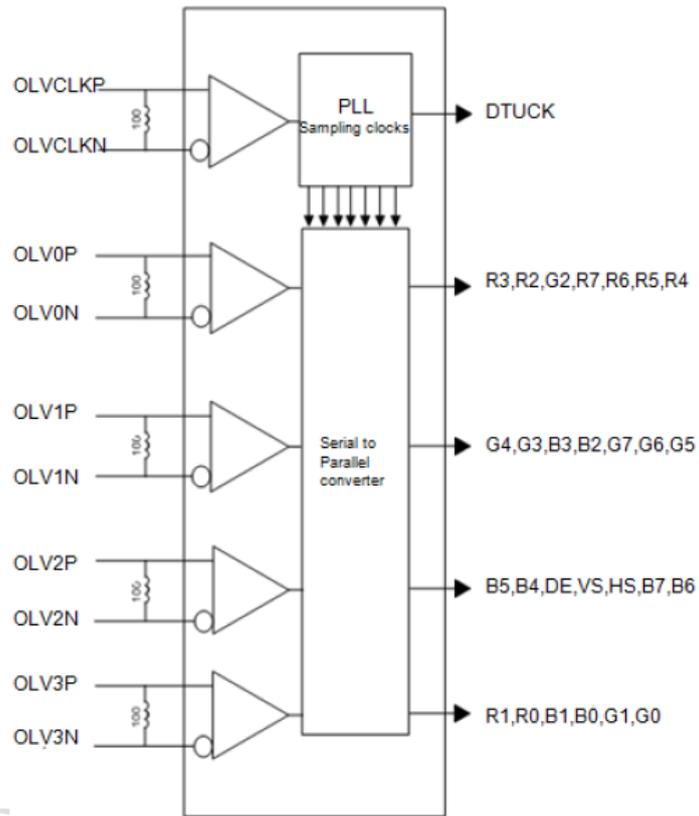
Voltage Definitions



Measurement System

8.4.2 LVDS Receiver Internal Circuit

It shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link.



LVDS Receiver Internal Circuit

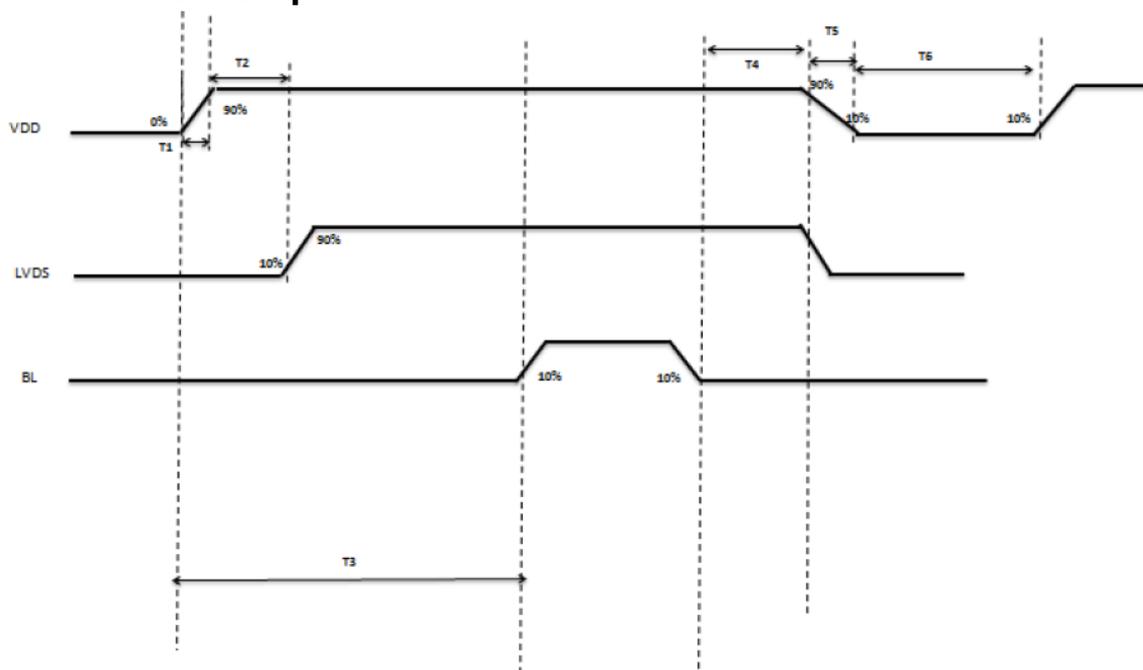
9. Interface Timing

Parameter		Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency		Fclk	(69.49)	(71.15)	(75.54)	MHz
HSYNC	Period	TH	(1524)	(1540)	(1566)	Clocks
	Horizontal display area	THD	1280			Clocks
	Blanking	THBP+ THFP	(244)	(260)	(286)	Clocks
VSYNC	Period	TV	(760)	(770)	(804)	HS
	Vertical display area	TVD	720			HS
	Blanking	TVBP + TVFP	(40)	(50)	(84)	HS
Frame Rate		FV	-	60	-	Hz

Note(1) $HT * VT * \text{Frame Frequency} \leq 75.54 \text{ MHz}$

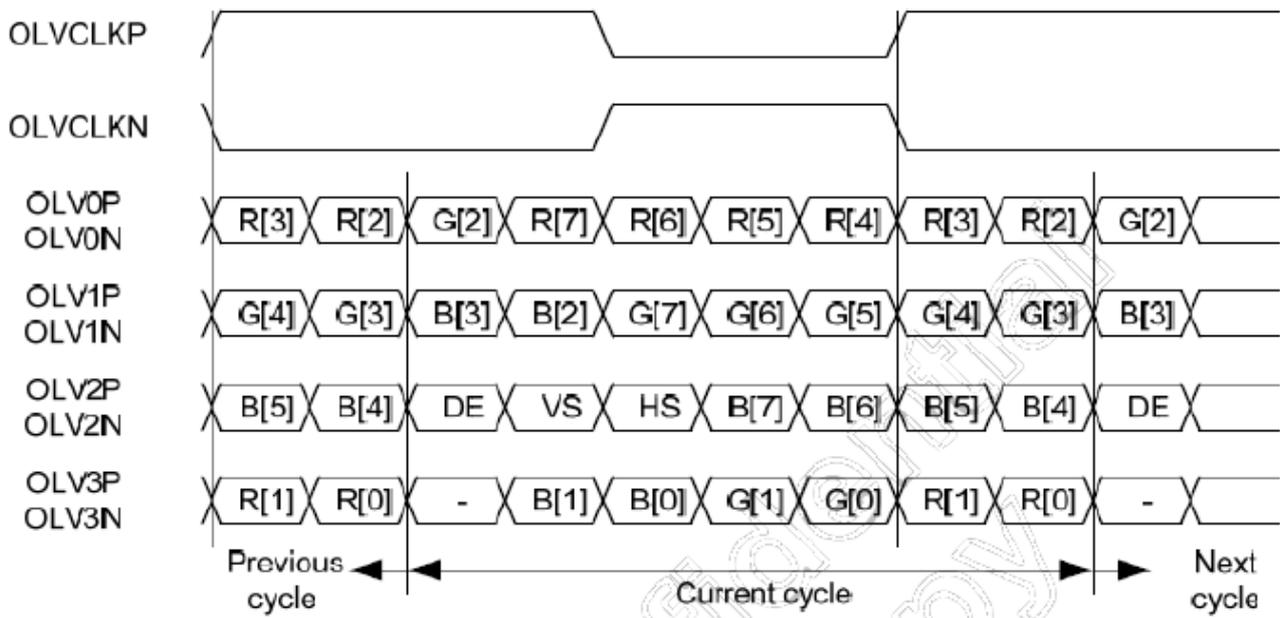
Note(2) All reliabilities are specified for timing specification based on refresh rate of 60Hz. It is secured only for function under lower refresh rate; 60Hz at Normal mode.

10. Power On/Off Sequence



Parameter	Symbol	Min.	Typ.	Max.	Unit
VDD rising time 0%~90%	T1	(1)	-	(10)	ms
VDD90% to LVDS10%	T2	(2)	-	-	ms
VDD rising time 0%to BL10%	T3	(190)	-	-	ms
BL Off to VDD off	T4	(90)	-	-	ms
VDD falling time	T5	-	-	(1)	s
VDD restart time	T6	(1)	-	-	s

11. Displayed Color and Input Data



12. Reliability Test Conditions

Test Item	Test Conditions	Note
High Temperature Operation	85±3°C , t=240 hrs	
Low Temperature Operation	-30±3°C , t=240 hrs	
High Temperature Storage	90±3°C , t=240 hrs	(1),(2)
Low Temperature Storage	-40±3°C , t=240 hrs	(1),(2)
Storage Humidity Test	60 °C, Humidity 90%, 240 hrs	(1),(2)
Vibration Test (Packing)	Sweep frequency : 10 ~ 50 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	(2)

Note(1) Condensation of water is not permitted on the module.

Note(2) The module should be inspired after 1 hour storage in normal conditions (15~35°C , 45~65%RH).

Note(3) The module shouldn't be tested over one condition, and all the tests are independent.

Note(4) All reliability tests should be done without the protective film.

Definitions of life end point:

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of initial value.

13. Use Precautions

13.1 Handling precautions

- (1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.
- (2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzine and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.
- (3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.
- (4) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

13.2 Installing precautions

- (1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx. $1M\Omega$ and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.
- (2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.
- (3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.
- (4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off.

13.3 Storage precautions

- (1) Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.
- (2) Choose the dark spaces where the product is not exposed to direct sunlight or fluorescent light.
- (3) Store the products as they are put in the boxes provided from us or in the same conditions as we recommend.

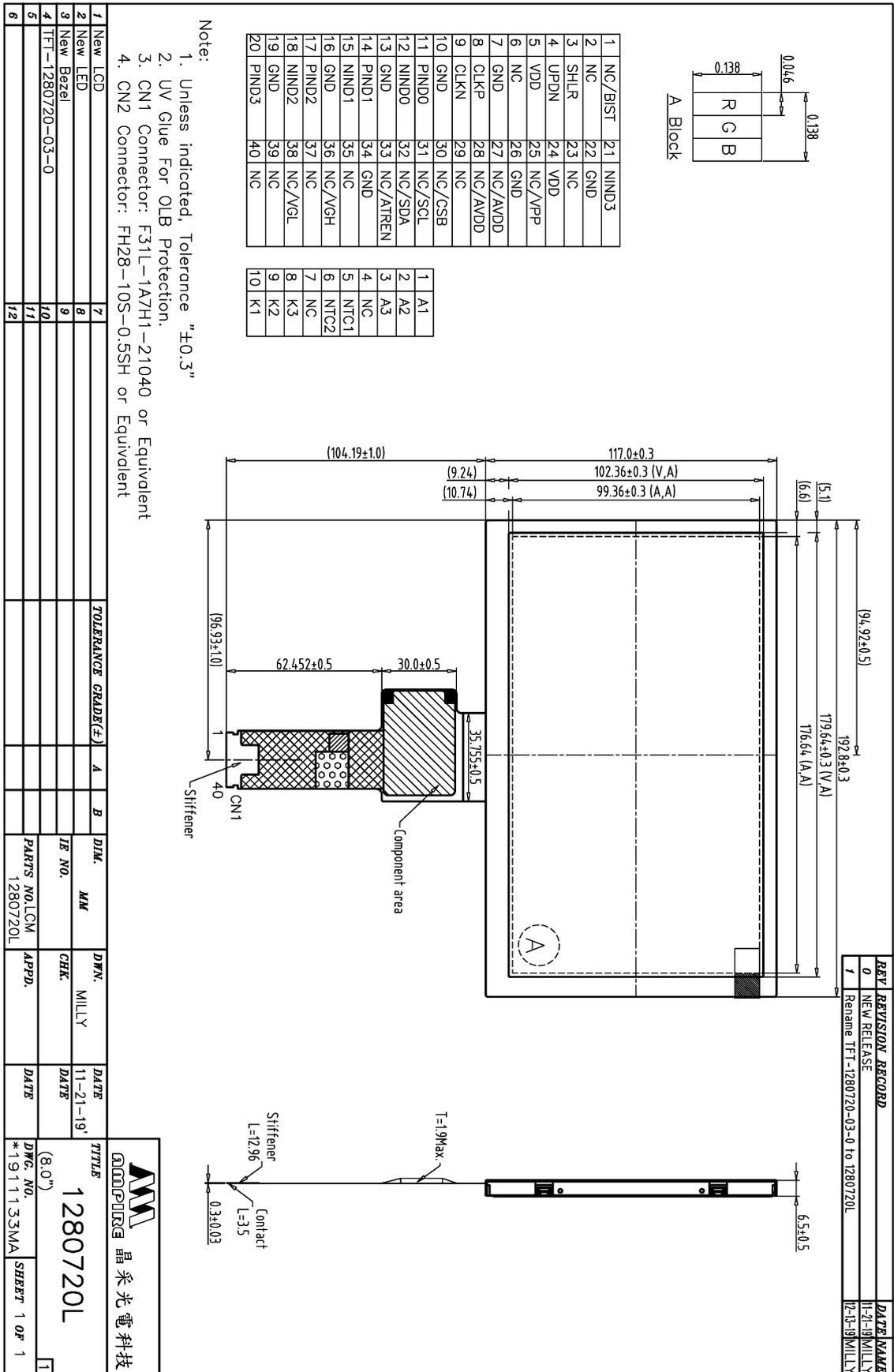
13.4 Operating precautions

- (1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.
- (2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.
- (3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC drive voltage.
- (4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.
- (5) Make certain that each signal noise level is within the standard (L level: 0.2V_{dd} or less and H level: 0.8V_{dd} or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.
- (6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.
- (7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.
- (8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

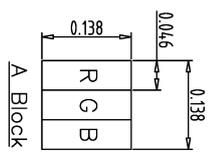
13.5 Other

- (1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.
- (2) The residual image may exist if the same display pattern is shown for hours. This residual image, however, disappears when another display pattern is shown. Or, the drive is interrupted and left for a while. But this is not a problem on reliability.
- (3) Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.
- (4) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

14. Outline Dimension

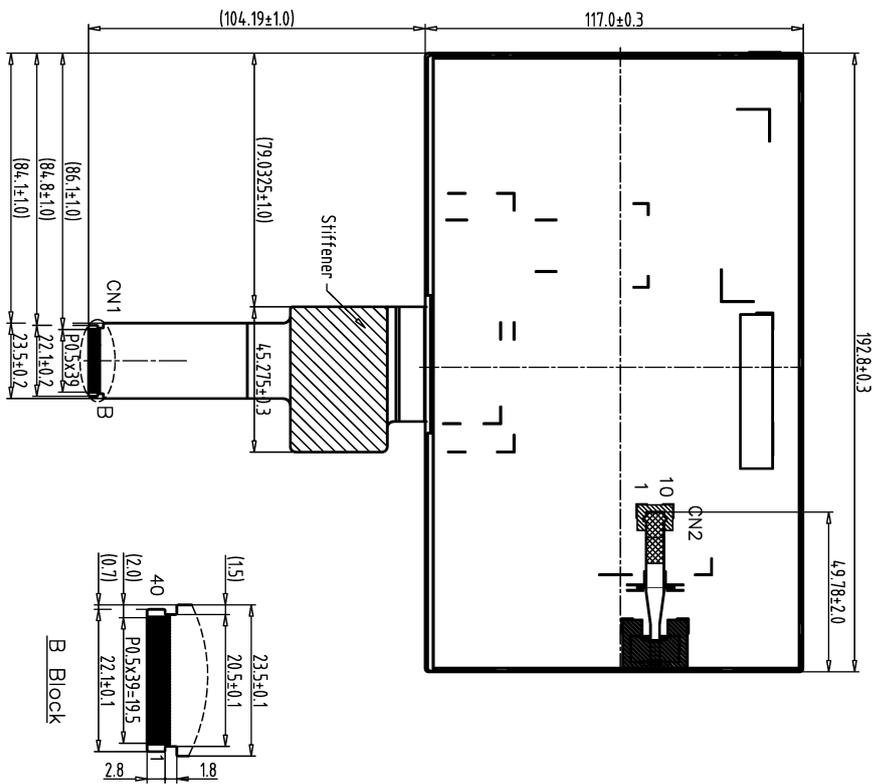


REV.	REVISION RECORD	DATE	NAME
0	NEW RELEASE	11-21-19	MILLY
1	Rename TFT-1280720-03-0 to 1280720L	12-13-19	MILLY



1	NC/BIST	21	NIND3
2	NC	22	GND
3	SHLR	23	NC
4	UPDN	24	VDD
5	VDD	25	NC/VPP
6	NC	26	GND
7	GND	27	NC/AVDD
8	CLKP	28	NC/AVDD
9	CLKN	29	NC
10	GND	30	NC/CSB
11	PINDO	31	NC/SCL
12	NINDO	32	NC/SDA
13	GND	33	NC/ATREN
14	PIND1	34	GND
15	NIND1	35	NC
16	GND	36	NC/VGH
17	PIND2	37	NC
18	NIND2	38	NC/VGL
19	GND	39	NC
20	PIND3	40	NC

1	A1
2	A2
3	A3
4	NC
5	NTC1
6	NTC2
7	NC
8	K3
9	K2
10	K1



- Note:
1. Unless indicated, Tolerance "±0.3"
 2. UV Glue For OLB Protection.
 3. CN1 Connector: F31L-1A7H1-21040 or Equivalent
 4. CN2 Connector: FH28-10S-0.5SH or Equivalent

	TOLERANCE	GRADE(F)	A	B	DIM.	MM	DWN.	MILLY	DATE	DATE	DATE	DATE	DATE
1	New LCD									11-21-19			
2	New LED												
3	New Bezel												
4	TFT-1280720-03-0												
5													
6													

AMPIRE 晶采光電科技
 TITLE: 1280720L
 DWG. NO.: (8.0") *1911134MA
 SHEET: 1 OF 1

15. Package
TBD