



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-800480SHMQW-T00
Approved by	
Date	

- Preliminary Specification  
 Formal Specification

**AMPIRE CO., LTD.**

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Approved by	Checked by	Organized by
Patrick	Simon	Jessica

This Specification is subject to change without notice.

## RECORD OF REVISION

Revision Date	Page	Contents	Editor
2021/12/28	--	New Release	Jessica
2022/02/07	6,8	Update timing table and LED driving conditions	Jessica
2022/03/02	15	Update Touch Panel Electrical Specification	Jessica

## 1. Introduction

It's a 7 inches Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 7" TFT-LCD panel, LED backlight.

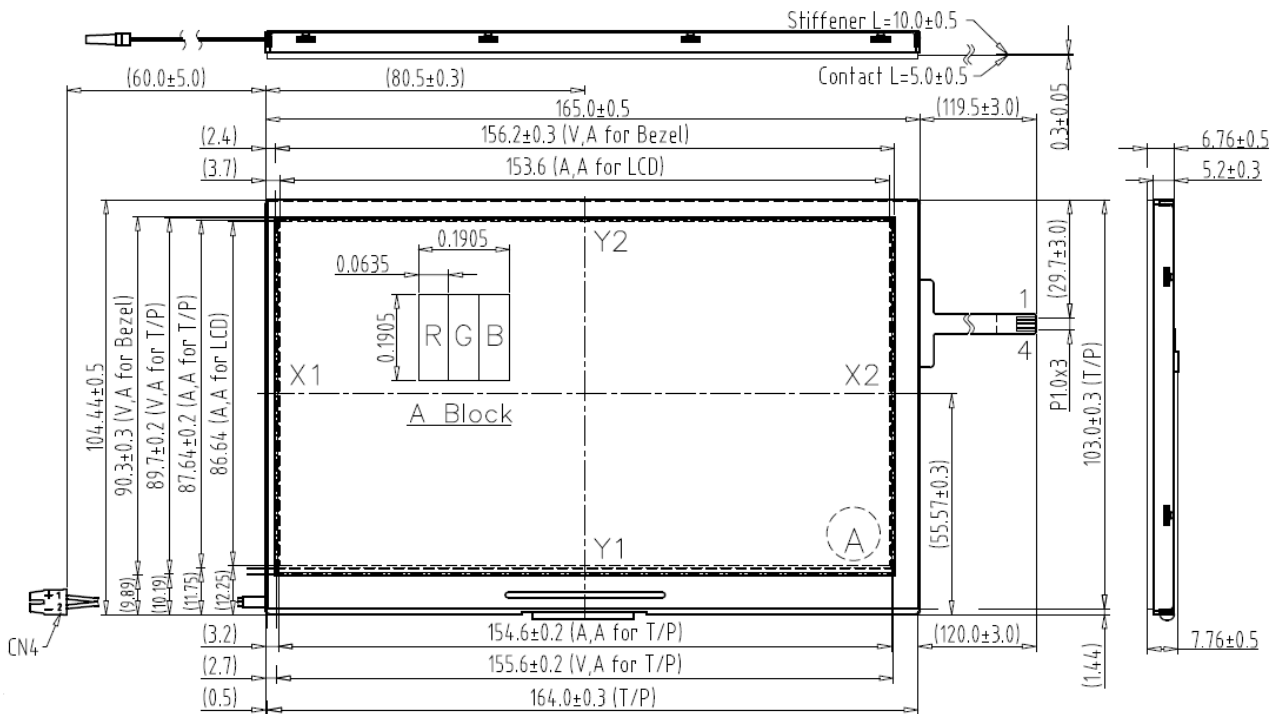
- (1) Construction: 7" a-Si TFT active matrix, White LED Backlight.
- (2) Resolution (pixel): 800(R.G.B) X480
- (3) Number of the Colors: 262,144 colors (R, G, and B 6 bit digital each)
- (4) LCD type: Transmissive, normally White
- (5) Interface: TTL
- (6) Viewing Direction: 6 o'clock (Gray inversion)
- (7) Touch panel

### 1.1 Features

- (1) Input interface voltage: 3.3V

## 2. Physical Specifications

Item	Specifications	unit
LCD size	7 inch (Diagonal)	
Resolution	800 x (RGB) x 480	dot
Pixel pitch	0.192(W) x 0.1805(H)	mm
Color arrangement	RGB-stripe	
interface	Digital	



### 3. Absolute Max. Ratings

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Voltage	VCC	-0.5	--	5	V	
Operation Temperature	TOP	-20	-	70	°C	
Storage Temperature	TST	-30	-	80	°C	

Note(1) 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.

## 4. Electrical Characteristics

### 4.1 DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply	VCC	3.0	3.3	3.6	V	
Input Voltage for logic	H Level	VIH	0.7 VCC	--	VCC	V
	L Level	VIL	0	--	0.3 VCC	V
Power Supply current	ICC		100		mA	Note1

Note(1) TFT power supply current. VCC=3.0V, fV =60Hz, Ta=25°C, Display pattern: All Black

### 4.2 AC Characteristics

#### TTL

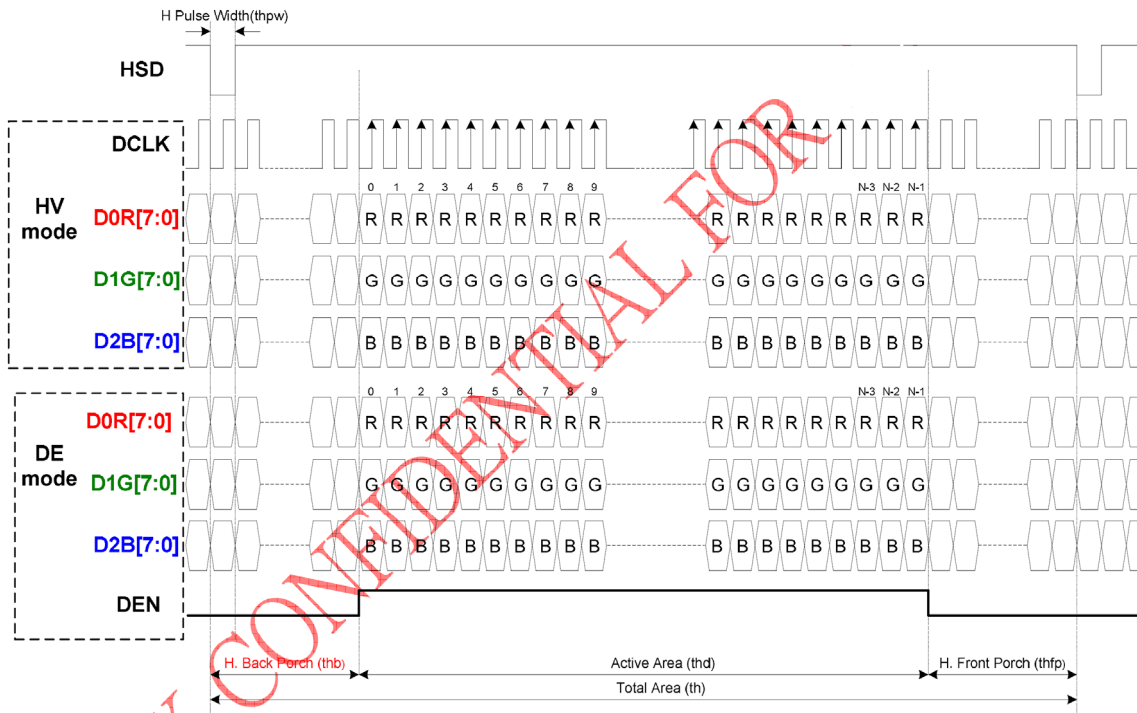
- Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd		800		DCLK
DCLK frequency	fclk	-	30	50	MHz
One Horizontal Line	th	889	928	1143	DCLK
HS pulse width	thpw	1	48	255	DCLK
HS Back Porch (Blanking)	thb		88		DCLK
HS Front Porch	thfp	1	40	255	DCLK
DE mode Blanking	th-thd	85	128	512	DCLK

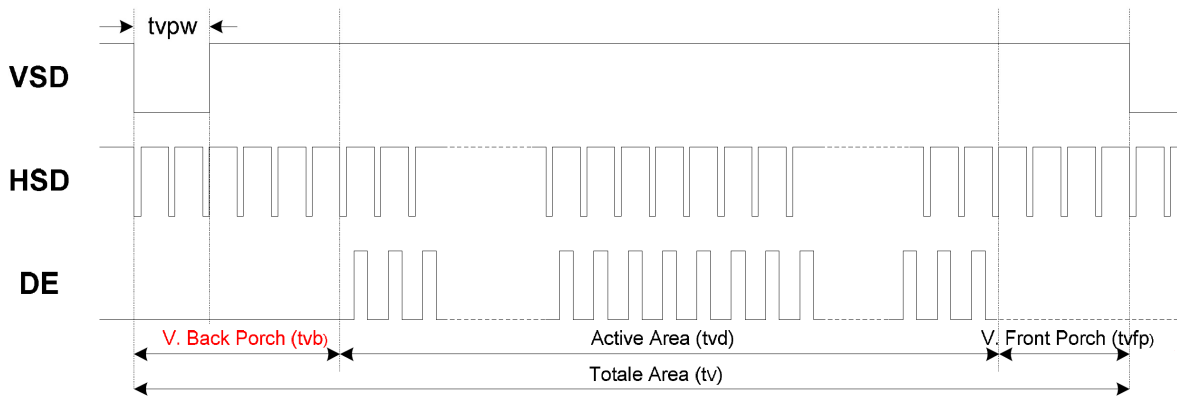
- Vertical timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		480		T <sub>H</sub>
VS period time	tv	513	525	767	T <sub>H</sub>
VS pulse width	tvpw	3	3	255	T <sub>H</sub>
VS Back Porch (Blanking)	tvb		32		T <sub>H</sub>
VS Front Porch	tvfp	1	13	255	T <sub>H</sub>
DE mode Blanking	tv-tvd	4	45	255	T <sub>H</sub>

## .2. Horizontal Input Timing



## Vertical Input Timing

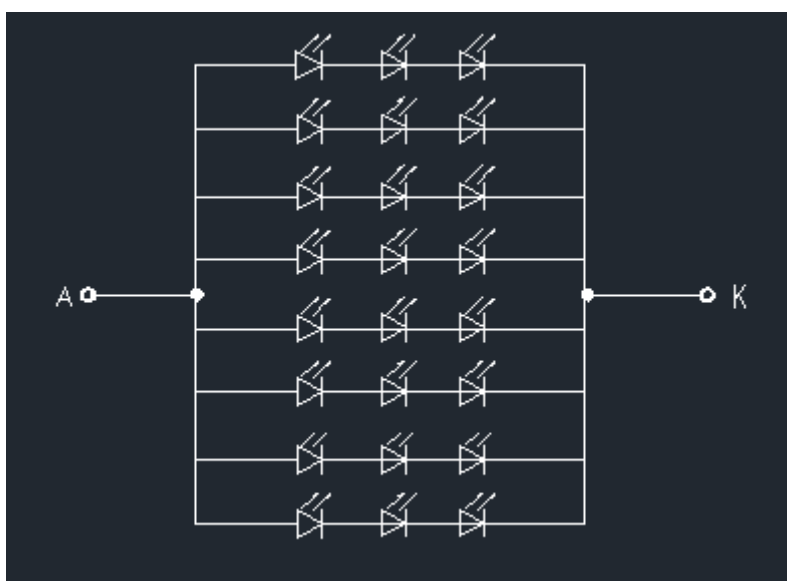


## 5. LED Driving Conditions

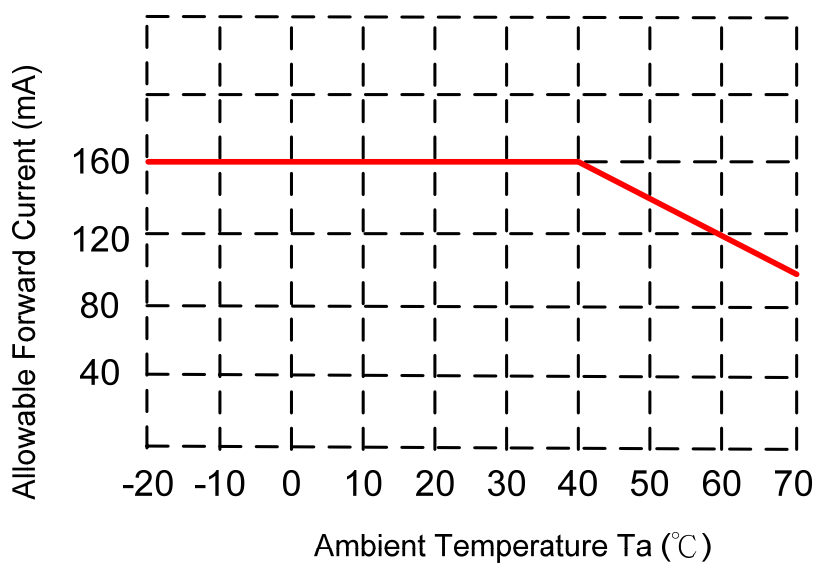
Item	Symbol	Min.	Typ.	Max.	Unit	Condition
LED Backlight Voltage	VAK	-	9.9	-	V	Note(1) IAK = 160mA
LED Backlight Current	IAK	-	160	-	mA	
LED Life Time	-	--	30K	--	Hr	Note(2)

Note(1) The backlight must be driven by constant current source.

Note(2) Brightness to be decreased to 50% of the initial value.



Note(3) When LCM is operated over 40°C ambient temperature, the **IAK** should be follow :





## 6. Interface

Pin no	Symbol	Function
1	GND	Ground
2	GND	Ground
3	NC	No connection
4	VCC	Power supply for Digital Circuit
5	VCC	Power supply for Digital Circuit
6	VCC	Power supply for Digital Circuit
7	VCC	Power supply for Digital Circuit
8	NC	No connection
9	DE	Data Enable Timing Signal
10	GND	Ground
11	GND	Ground
12	GND	Ground
13	B5	Blue data (MSB)
14	B4	Blue data
15	B3	Blue data
16	GND	Ground
17	B2	Blue data
18	B1	Blue data
19	B0	Blue data (LSB)
20	GND	Ground
21	G5	Green data (MSB)
22	G4	Green data
23	G3	Green data
24	GND	Ground
25	G2	Green data
26	G1	Green data
27	G0	Green data (LSB)
28	GND	Ground
29	R5	Red data (MSB)
30	R4	Red data
31	R3	Red data
32	GND	Ground
33	R2	Red data
34	R1	Red data
35	R0	Red data (LSB)
36	GND	Ground
37	GND	Ground
38	DCLK	Data Clock :Latch Data at Falling Edge
39	GND	Ground
40	GND	Ground

Note: User's connector part number is **PF050-40ZSG-F09-S** manufactured by UJU or equivalent.

## 7. Optical Characteristics

Item	Symbol	Condition	Values			Unit	Note	
			Min.	Typ.	Max.			
Viewing angle (CR ≥ 10)	θL	Φ = 180° (9 o'clock)	60	70	--	degree	Note1	
	θR	Φ = 0° (3 o'clock)	60	70	--			
	θT	Φ = 90° (12 o'clock)	40	50	--			
	θB	Φ = 270° (6 o'clock)	50	60	--			
Response time	TON	Normal θ=Φ=0°	--	5	7	msec	Note3	
	TOFF		--	20	28	msec		
Contrast ratio	CR		400	500	--	--	Note4	
Color chromaticity	WX		Normal θ=Φ=0°	Typ. -0.05	TBD	Typ. +0.05	--	Note5 Note6
	WY				TBD		--	
	RX				TBD			
	RY				TBD			
	GX				TBD			
	GY	TBD						
	BX	TBD						
	BY	TBD						
Luminance (central point)	L		<b>240</b>	<b>280</b>	--	cd/m <sup>2</sup>	Note6	
Luminance uniformity	YU		70	75	--	%	Note6	

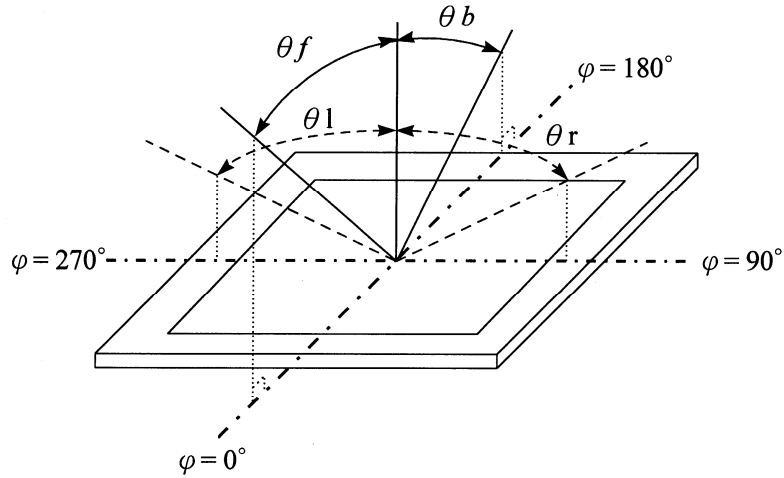
Test Conditions:

VCC = 3.3V, IAK = 160mA (Backlight current), the ambient temperature is 25°C.

The test systems refer to Note 2.

Note(1) Ta=25°C. To be measured on the center area of panel after 10 minutes operation.

Note(2) Definition of Viewing Angle



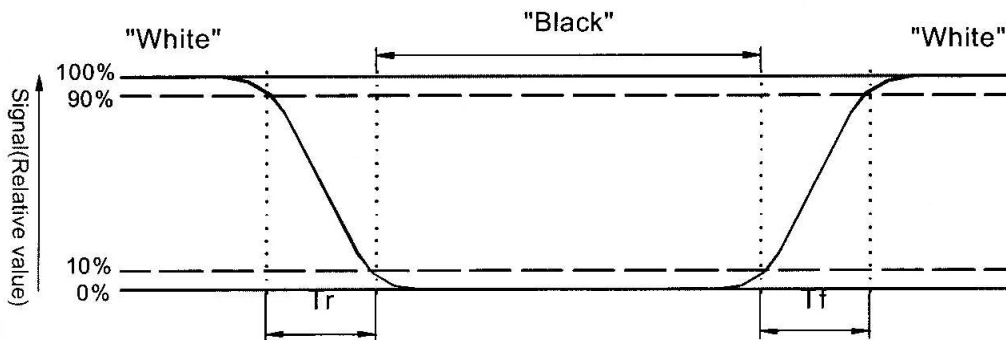
Note(3) Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

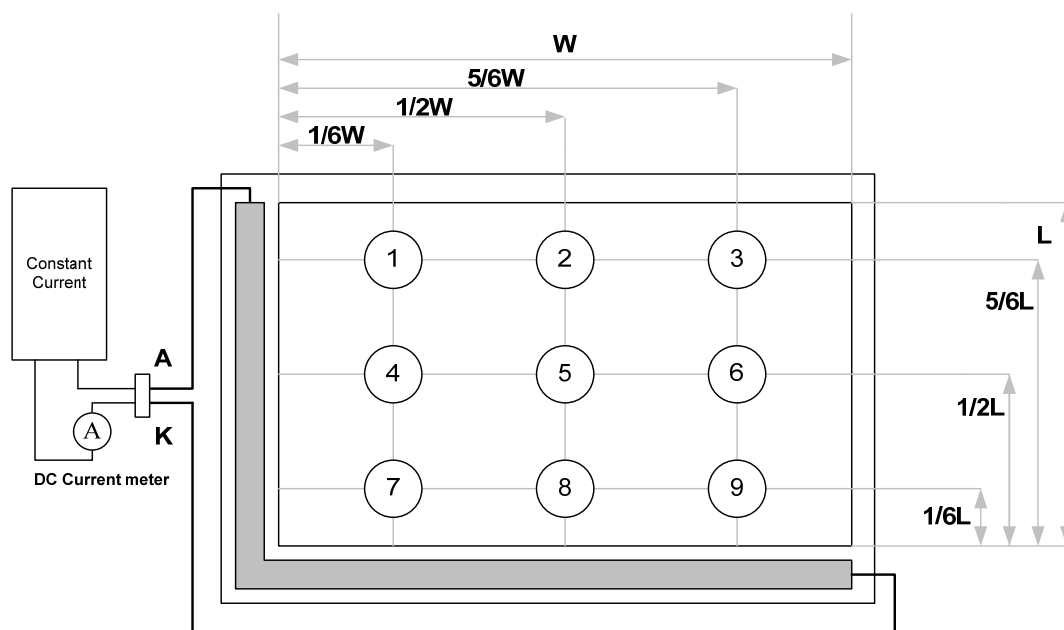
$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector Output when LCD is at "Black" state}}$$

Note(4) Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "black" to "white" (falling time) and from "white" to "black" (rising time) respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



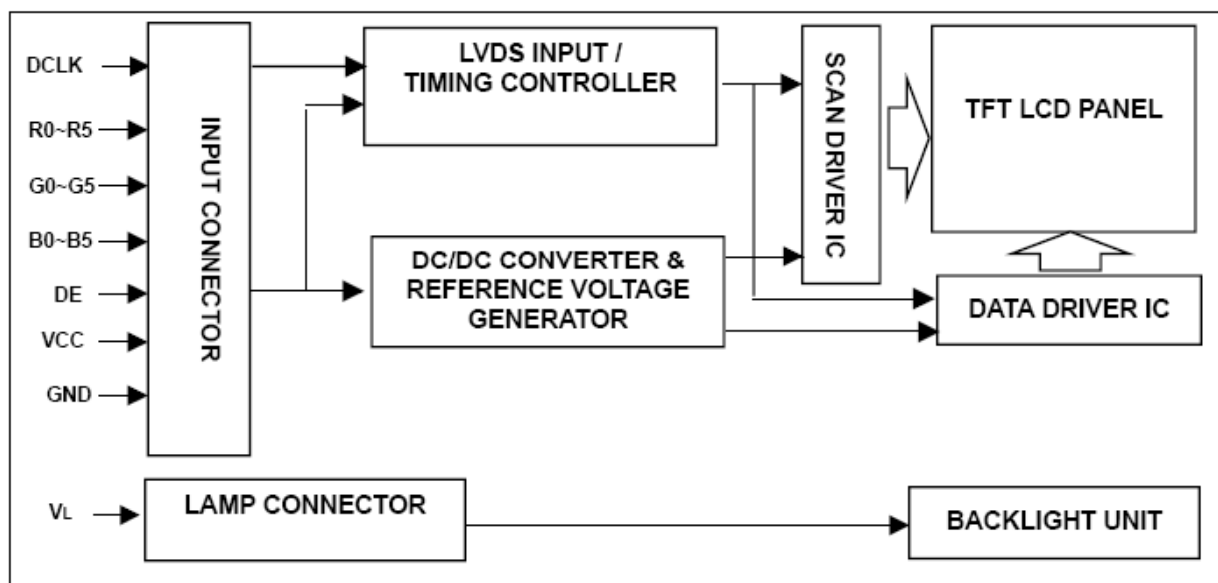
Note(5) Luminance is measured at point 5 of the display.



Note(6) Definition of Luminance Uniformity

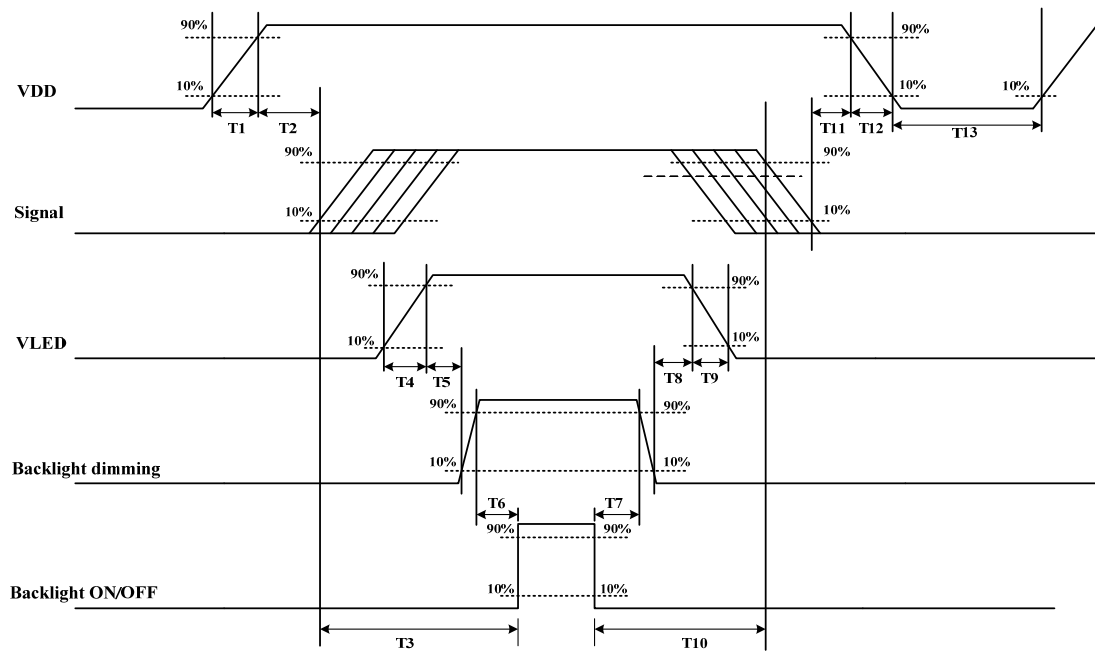
$$\Delta L = [L (\text{min.}) \text{ of } 9 \text{ points} / L (\text{max.}) \text{ of } 9 \text{ points}] \times 100\%$$

## 8. Block Diagram



## 9. Power ON/OFF sequence

VDD power and LED on/off sequence are as follows. Interface signals are also shown in the chart. Signal shall be Hi-Z state or low level when VDD is off.



Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	0	40	50	[ms]
T3	200	-	-	[ms]
T4	0.5	-	10	[ms]
T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	-	-	10	[ms]
T10	110	-	-	[ms]
T11	0.5	16	50	[ms]
T12	-	-	100	[ms]
T13	1000	-	-	[ms]

## 10. Touch Panel Electrical Specification

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	500~950 $\Omega$
	Y Axis	140~560 $\Omega$
Insulating Resistance	DC 25 V	More than 20M $\Omega$
Linearity	--	$\leq 1.5 \%$
Notes life by Pen	Note a	100,000 times(min)
Input life by finger	Note b	1,000,000 times (min)

### Note A.

Notes area for pen notes life test is 10 x 9 mm.

Size of word is 7.5 x 6.75

Shape of pen end: R0.8mm

Load: 250 g

### Note B

By Silicon rubber tapping at same point

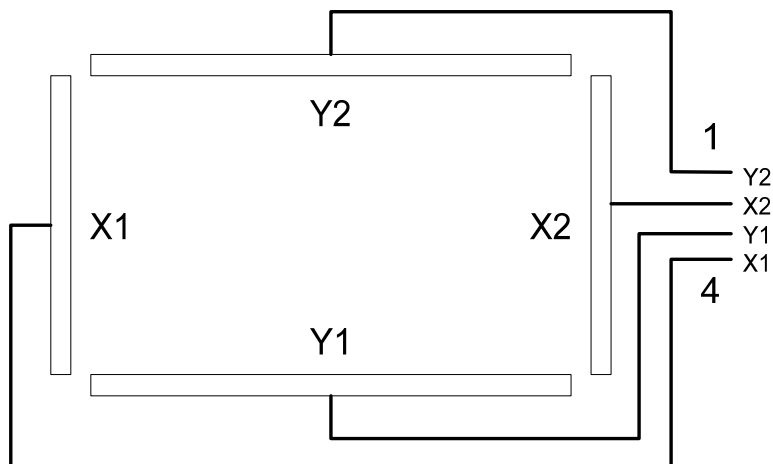
Shape of rubber end: R8mm

Load: 250gf

Frequency: 5 Hz

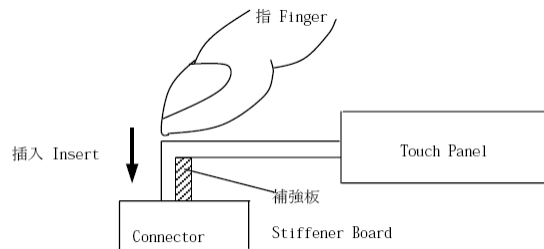
### Interface

No.	Symbol	Function
1	Y2	Touch Panel Top Signal in Y Axis
2	X2	Touch Panel Right Signal in X Axis
3	Y1	Touch Panel Bottom Signal in Y Axis
4	X1	Touch Panel Left Signal in X Axis



◇ **Attention**

- (1) Since touch panel is consist of Glass, pls. be careful your hand and other part from injury at handling. You must wear gloves at handling.
- (2) Do not put a heavy shock or stress on touch panel.
- (3) Do not lift Touch Panel by cable (FPC).
- (4) Do not add any stress only film face.  
(Ex. Don't transfer the panel by film face with vacuum)
- (5) Pls. use dry cloth or soft cloth with neutral detergent (after wring dry) or one with ethanol at cleaning. Do not use any organic solvent, acid or alkali solution.
- (6) Do not pile Touch Panel. Do not put heavy goods on Touch Panel.
- (7) Do not bend a cable of Touch Panel for prevent happen to line cut failure.  
Please don't uses following method for insert the cable to connector



- (8) Please pay attention for the matter as stated below at mounting design of touch panel & enclosure
  - 1. Enclosure support to fix touch panel must be out of view (transparent) area.  
(Do not design enclosure presses the view area to protect from miss input)
  - 2. Enclosure edge must be between view area & Guaranteed active area.  
(Enclosure edge must not touch with view area)
  - 3. We recommend the material of support to fix touch panel is elastic material.
  - 4. Do not bond top surface (film) of touch panel with enclosure.
  - 5. The corner parts (fig.\*) has conductivity. Do not touch any metal part after mounting.
  - 6. Special design is required for water resistance use.



## 11. Reliability Test Conditions

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C ,Dry t=240 hrs	
Low Temperature Operation	-20±3°C, Dry t=240 hrs	
High Temperature Storage	80±3°C , Dry t=240 hrs	1,2
Low Temperature Storage	-30±3°C ,Dry t=240 hrs	1,2
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. ( 1 cycle ) Total 100 cycle(Dry)	1,2
Humidity Test	40 °C, Humidity 90%, 240 hrs	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 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.

## **12. Use Precautions**

### **12.1 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.

### **12.2 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

### **12.3 Storage precautions**

- (1) Avoid a high temperature and humidity area. Keep the temperature between  $0^{\circ}\text{C}$  and  $35^{\circ}\text{C}$  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.

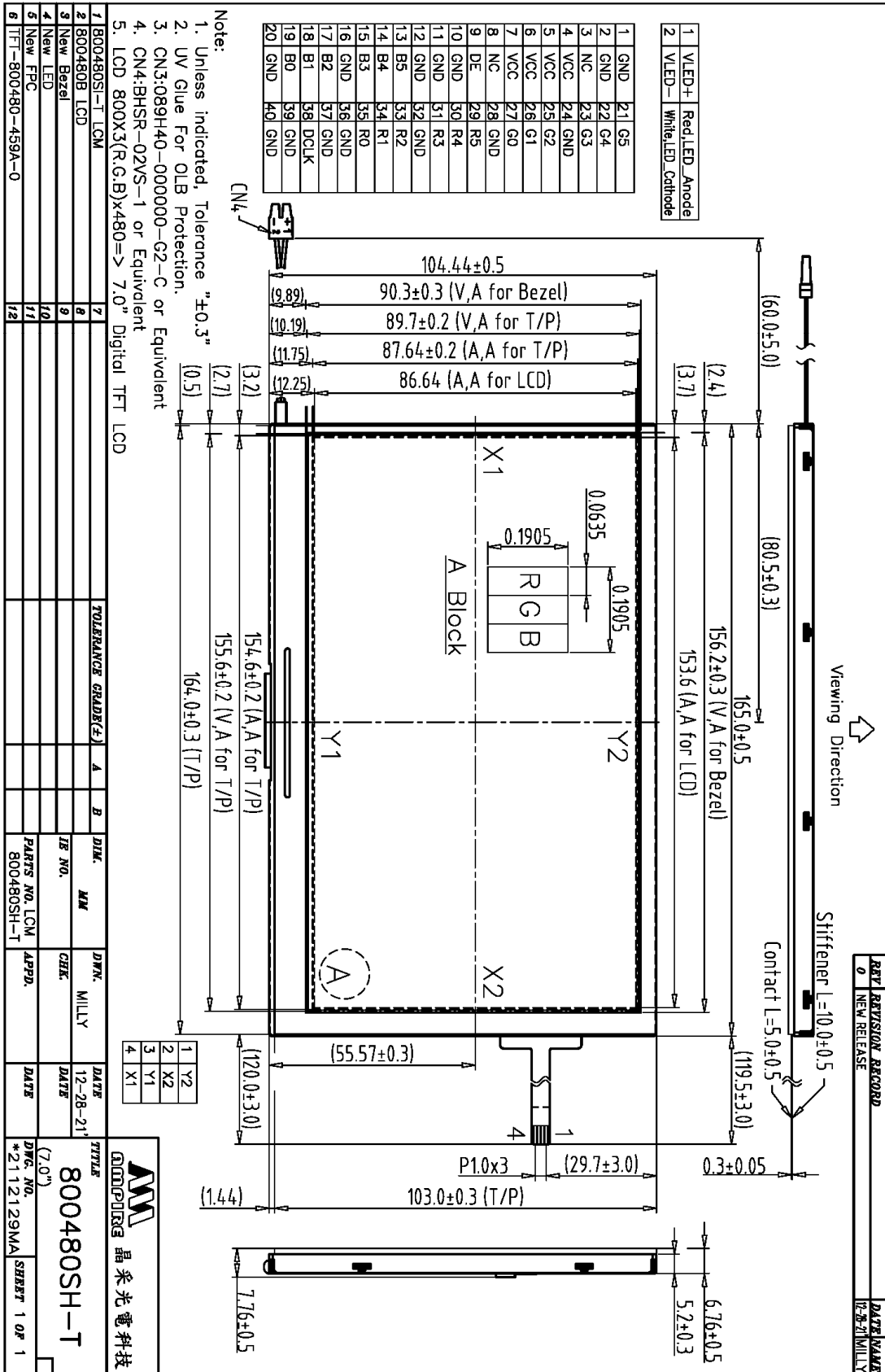
## 12.4 Operating precautions

- (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: 0.2VCC or less and H level: 0.8VCC 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.

## 12.5 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) AMIPRE will provide one year warranty for all products and three months warranty for all repairing products.
- (4) 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.

# 13. Outline Dimension

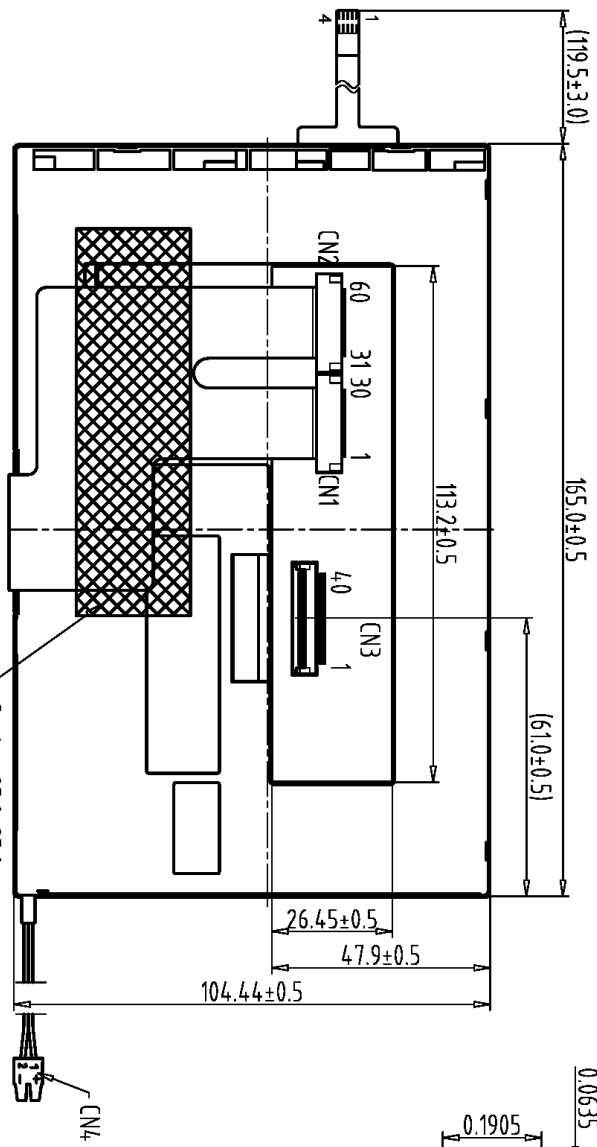


REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	17-08-21	MILLY

1	VLED+	Red.LED_Anode
2	VLED-	White.LED_Cathode

1	GND	21	G5
2	GND	22	G4
3	NC	23	G3
4	VCC	24	GND
5	VCC	25	G2
6	VCC	26	G1
7	VCC	27	G0
8	NC	28	GND
9	DE	29	R5
10	GND	30	R4
11	GND	31	R3
12	GND	32	GND
13	B5	33	R2
14	B4	34	R1
15	B3	35	R0
16	GND	36	GND
17	B2	37	GND
18	B1	38	DCLK
19	B0	39	GND
20	GND	40	GND



Back View

Capton 85.0x25.0  
(1811024629)

1	Y2
2	X2
3	Y1
4	X1

**AMI**  
晶采光电科技

1	800480SH-T	LCM	7		TOLERANCE GRABER(S)	A	B	DIR.	MM	DWR.	MILLY	DATE	STYLE
2	800480B	LCM	8					IE NO.		CHK.		DATE	800480SH-T
3	New Bezel		9									DATE	(7.0")
4	New LED		10									DATE	DWG. NO.
5	New FPC		11									DATE	*2112130MA
6	FT-800480-459A-0		12									DATE	SHEET 1 OF 1

Note:

1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN3:089H40-000000-G2-C or Equivalent
4. CN4:BHSR-02YS-1 or Equivalent
5. LCD 800X3(R,G,B)x480=> 7.0" Digital TFT LCD

**14. Package**  
TBD