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-800480S5LMQW-A0H**
Approved by	
Date	

☐ **Preliminary Specification**
■ **Formal Specification**

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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
2022/12/16	--	New Release	Jessica

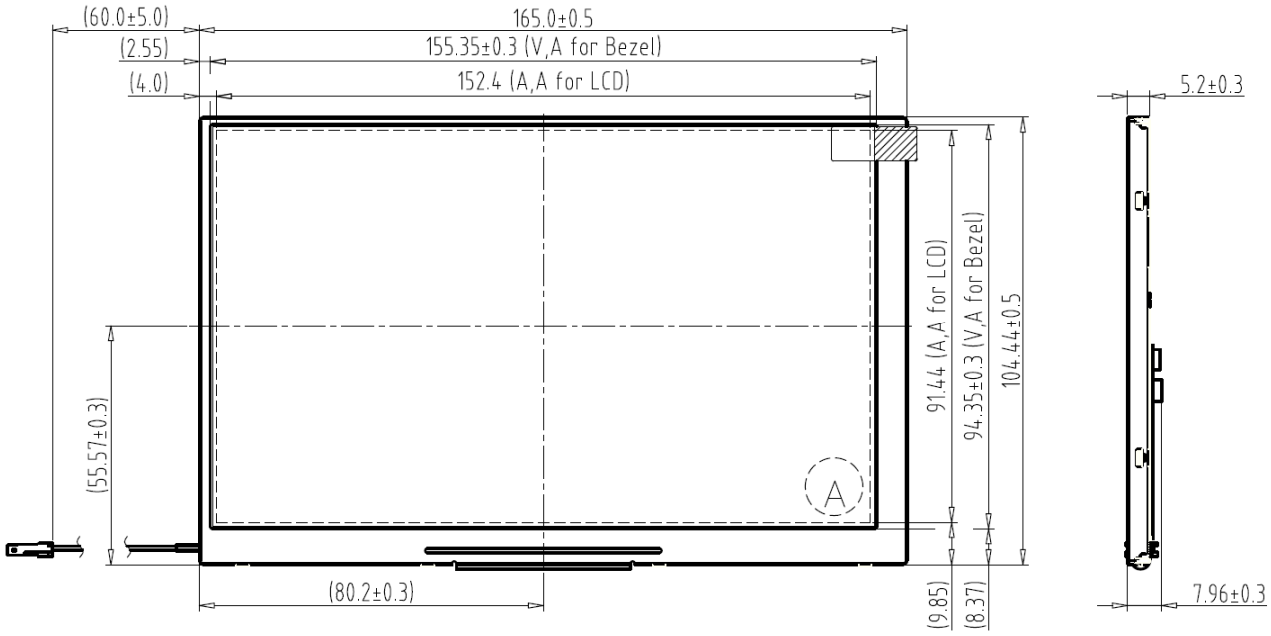
1. Introduction

Ampire Display Module is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD panel, timing controller. This TFT-LCD has a high resolution (800(R.G.B) X 480) and can display up to 262,144 colors.

(1) Construction: 7” a-Si TFT active matrix, White LED Backlight and Touch Panel.
(2) Resolution (pixel): 800(R.G.B) X 480
(3) Number of the Colors: 262K colors (R , G , B 6 bit digital each)
(4) LCD type: Transmissive , normally White
(5) Power Supply Voltage: 3.3V for logic voltage.
(6) Viewing Direction: 6 O’clock (gray inversion)
(7) Interface: LVDS interface

2. Physical Specifications

Item	Specifications	unit
Display resolution(dot)	800RGB (W) x 480(H)	dots
Pixel pitch	0.1905 (W) x 0.1905 (H)	mm
Color configuration	R.G.B Vertical stripe	
View direction	6 O'clock	
Brightness	**350**	cd/m^2
Contrast ratio	1000 : 1	
Backlight unit	LED	
Display color	262,144	colors



3. Absolute Max. Ratings

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power voltage	VCC	-0.5	4.0	V	GND=0V
Voltage range at any terminal		-0.5	VCC+0.3	V	

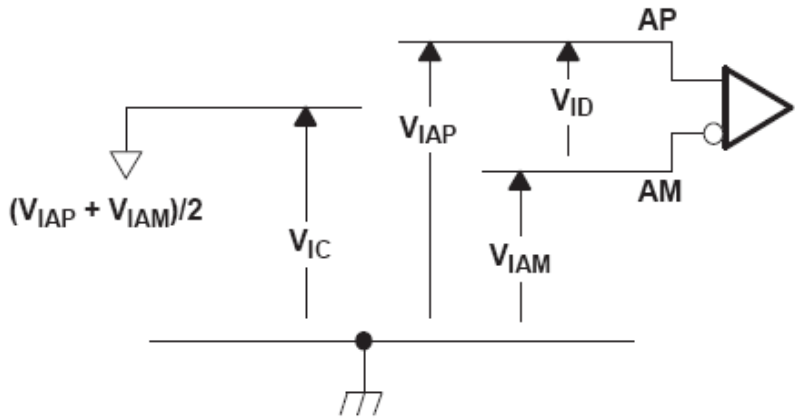
Note(1) The following values are maximum operation conditions , If exceeded , it may cause faulty operation or damage

4. Electrical Characteristics

4.1 TFT LCD Module voltage

TFT LCD Module

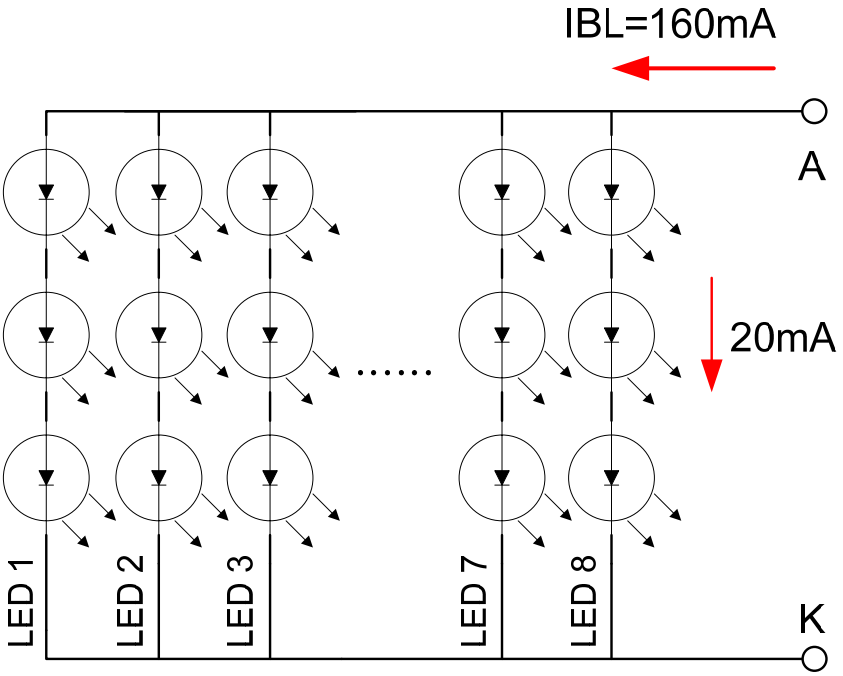
		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	3	3.3	3.6	V
V_{IH}	High-level input voltage ($\overline{SHTDN}$)	2			V
V_{IL}	Low-level input voltage ($\overline{SHTDN}$)			0.8	V
$\lvert V_{ID}\rvert$	Magnitude differential input voltage	0.1		0.6	V
V_{IC}	Common-mode input voltage	$\frac{\lvert V_{ID}\rvert}{2}$		$2.4 - \frac{\lvert V_{ID}\rvert}{2}$	V

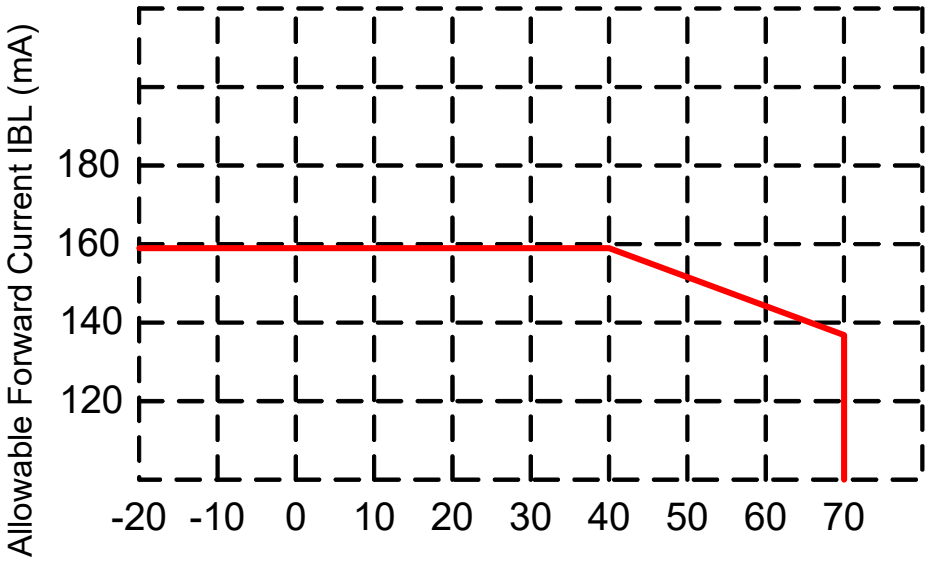


5. Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Backlight Voltage	VBL	-	9.9	-	V	IBL=160mA
LED Backlight Current	IBL	-	160	-	mA	VLED=5V VADJ=3.3V (duty 100%)

Note(1) The constant current source is needed for white LED back-light driving.
When LCM is operated over 60℃ ambient temperature, the IBL of the LED back-light should be adjusted to 145mA max





6. Interface

Pin No.	Symbol	Function
1	VDD	Power Supply:3.3V
2	VDD	Power Supply:3.3V
3	GND	Power Ground
4	GND	Power Ground
5	IN0-	Transmission Data of Pixels
6	IN0+	Transmission Data of Pixels
7	GND	Power Ground
8	IN1-	Transmission Data of Pixels 1
9	IN1+	Transmission Data of Pixels 1
10	GND	Power Ground
11	IN2-	Transmission Data of Pixels 2
12	IN2+	Transmission Data of Pixels 2
13	GND	Power Ground
14	CLK-	Sampling Clock
15	CLK+	Sampling Clock
16	GND	Power Ground
17	LEDADJ	LED Dimming Pin; **(Keep this pin NC in this model).**
18	VLED	LED Driver IC Power Supply 3.3V~5.0V; **(Keep this pin NC in this model).**
19	GND	Power Ground
20	GND	Power Ground

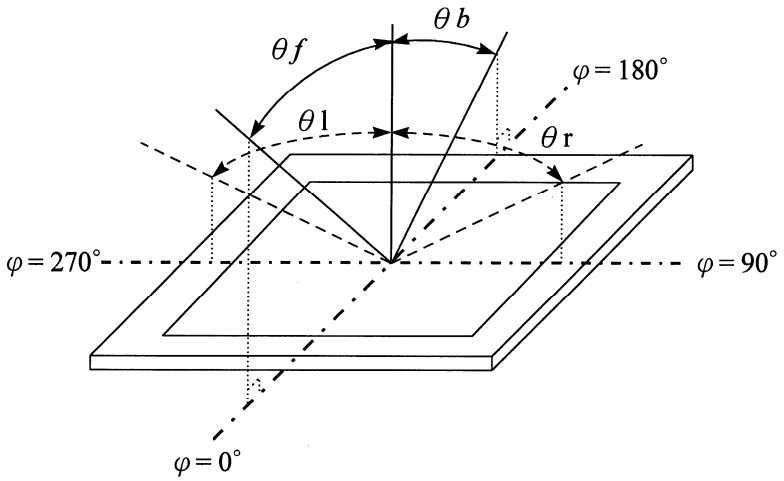
Note: The LCM AM-800480S5LMQW-A0 does not build-in LED driver circuit. Please keep pin 17 and 18 NC.

7. Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Front	θ f	CR≧10	50	60	--	deg.	(1)(2)(3)
	Back	θ b		60	70	--		
	Left	θ l		60	70	--		
	Right	θ r		60	70	--		
Contrast ratio		CR	Θ=Φ=0°	700	1000	--	--	(1)(3)
Response Time		T_r	Θ=Φ=0°	--	5	10	ms	(1)(4)
		T_f		--	15	20	ms	(1)(4)
Color chromaticity	White	Wx		0.26	0.31	0.36	--	(1)
		Wy		0.28	0.33	0.38		
Luminance		L	Θ=Φ=0°	**280**	**350**	--	cd/m^2	(1)(5)
Color Saturation		NTSC	Θ=Φ=0°	--	50	--	%	(1)(5)(6)

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

Note(2) Definition of Viewing Angle



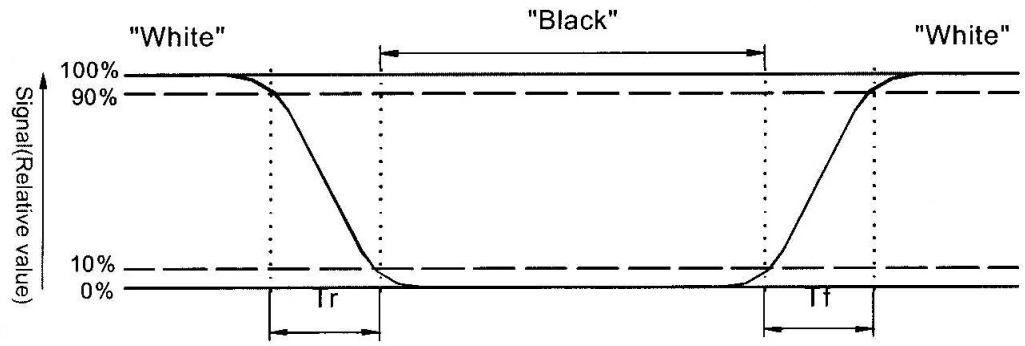
Note(3) Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

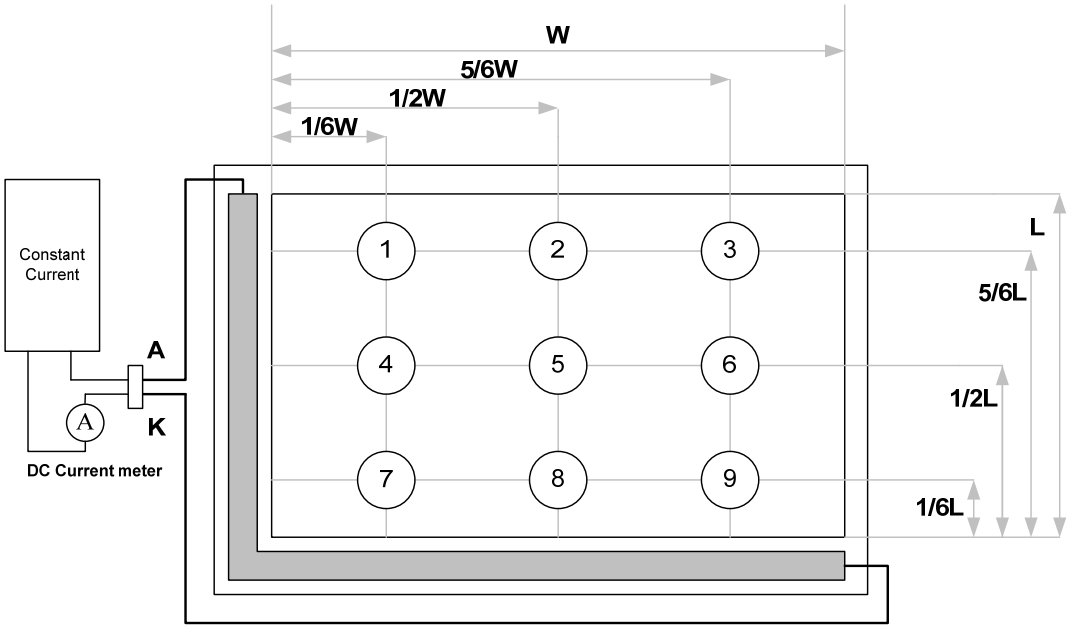
$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at “White” state}}{\text{Photo detector Output when LCD is at “Black” state}}$$

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

ΔL = [L (min.) of 9 points / L (max.) of 9 points] X 100%

8. Timing

LVDS Signal

switching characteristics over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
t_{su}	Setup time, D0–D20 to CLKOUT↓	C_L = 8 pF, See Figure 5	5			ns
t_h	Data hold time, CLKOUT↓ to D0–D20		5			ns
$t_{(RSKM)}$	Receiver input skew margin§ (see Figure 7)	t_c = 15.38 ns (±0.2%), |Input clock jitter| < 50 ps¶,	550	700		ps
t_d	Delay time, CLKIN↑ to CLKOUT↓ (see Figure 7)	V_{CC} = 3.3 V, t_c = 15.38 ns (±0.2%), T_A = 25°C	3	5	7	ns
t_{en}	Enable time, $\overline{SHTDN}$ to phase lock	See Figure 7		1		ms
t_{dis}	Disable time, $\overline{SHTDN}$ to off state	See Figure 8		400		ns
t_t	Transition time, output (10% to 90% t_r or t_f) (data only)	C_L = 8 pF		3		ns
t_t	Transition time, output (10% to 90% t_r or t_f) (clock only)	C_L = 8 pF		1.5		ns
t_w	Pulse duration, output clock			0.50 t_c		ns

† All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

§ The parameter $t_{(RSKM)}$ is the timing margin available to allocate to the transmitter and interconnection skews and clock jitter. The value of this parameter at clock periods other than 15.38 ns can be calculated from t_{RSKM} = tc/14 – 550 ps.

¶ |Input clock jitter| is the magnitude of the change in input clock period.

PARAMETER MEASUREMENT INFORMATION

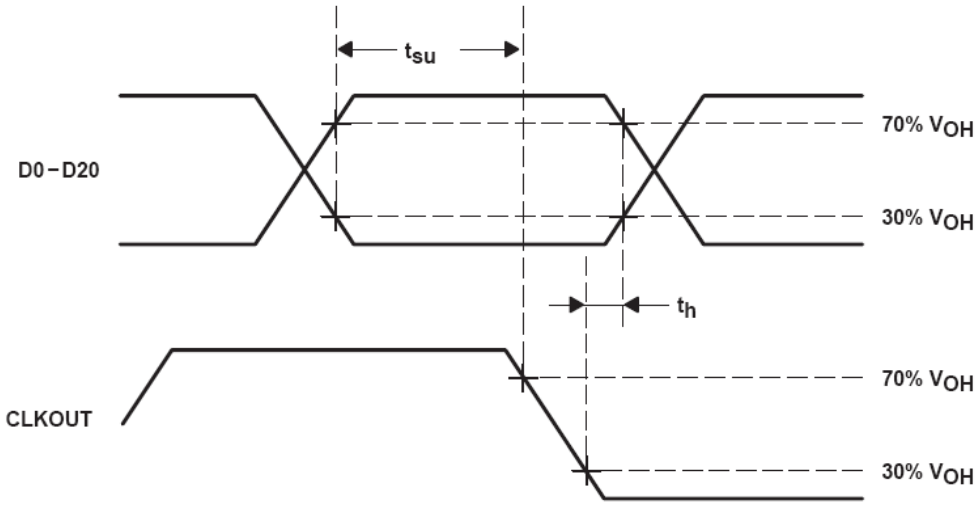


Figure 5. Setup and Hold Time Waveforms

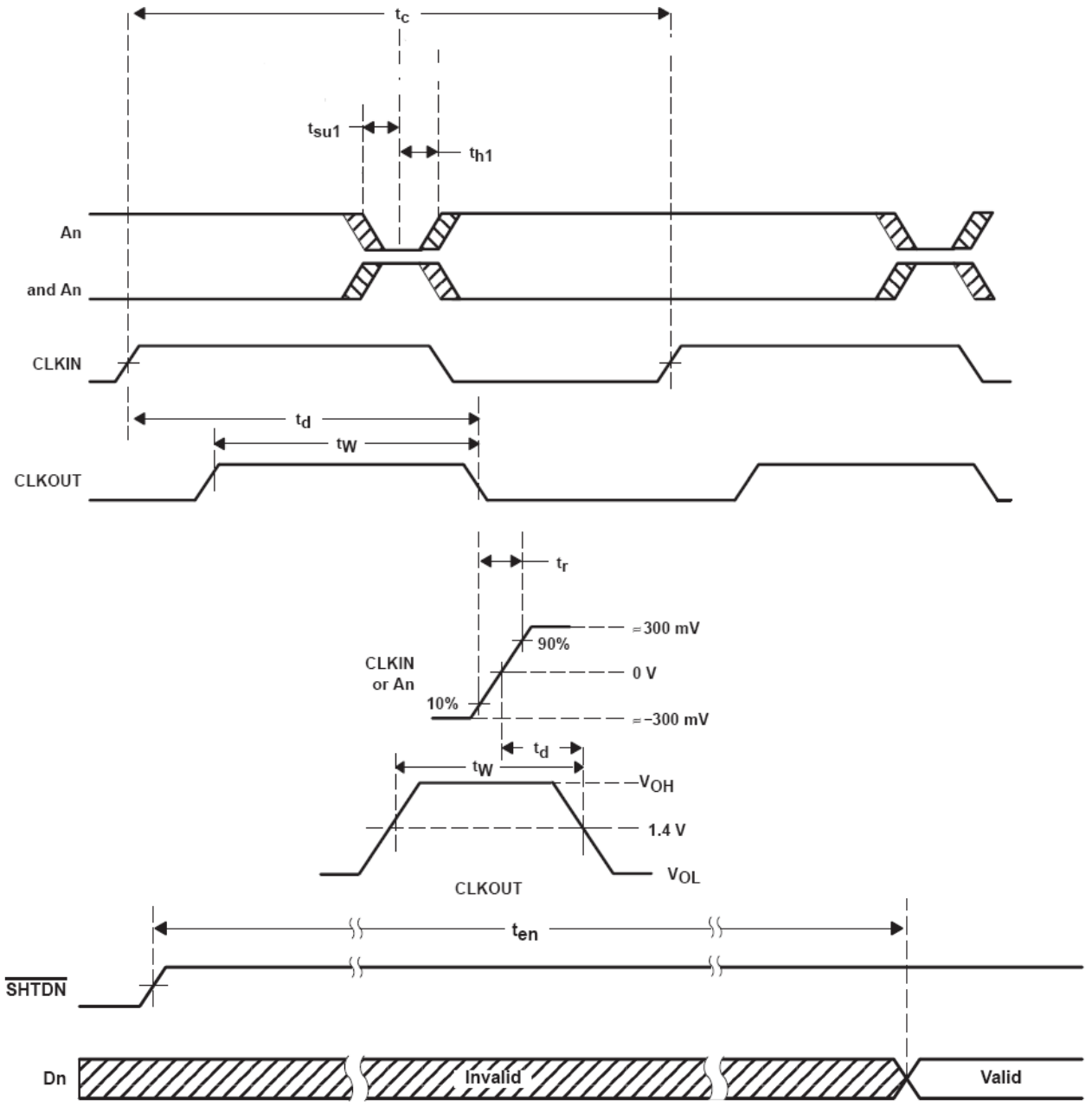


Figure 7. Enable Time Waveforms

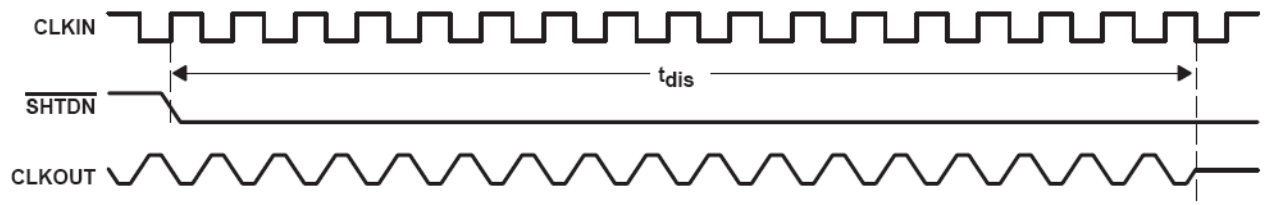


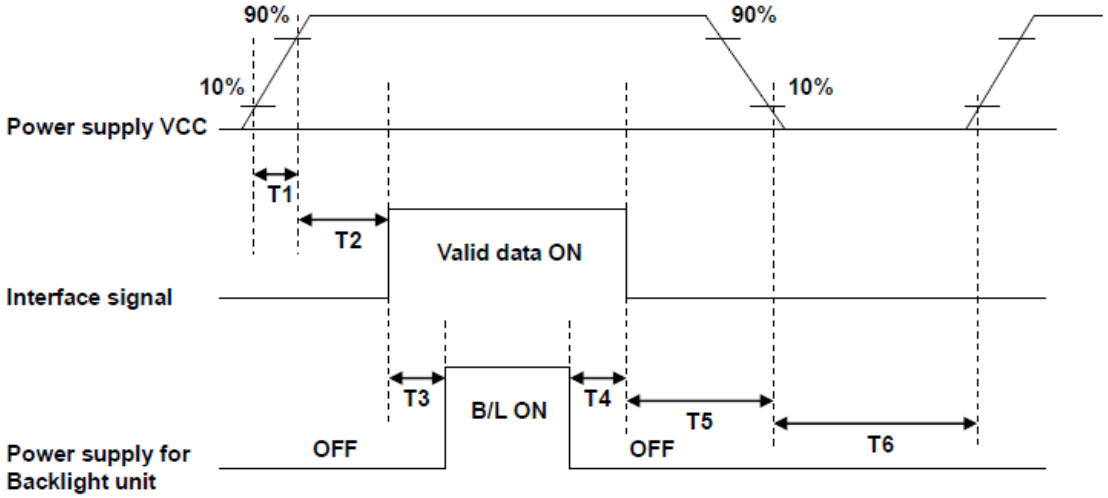
Figure 8. Disable Time Waveforms

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	6	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	204	354	DCLK	

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	3	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

Note: Frame rate is 60±5Hz

9. Power Sequence



Parameter	SPEC.			Unit
	Min.	Typ.	Max.	
T1	1		2	ms
T2	200			ms
T3	180			ms
T4	180			ms
T5	200			ms
T6	1000			ms

10. 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	-15°C ~ 25°C ~ 70°C 30 min. 5 min. 30 min. (1 cycle) Total 100 cycle(Dry)	1,2
Humidity Test	60 °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 inspected 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 the initial value.

11. Use Precautions

11.1 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.

11.2 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. 1MΩ 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

11.3 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.

11.4 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 dive 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: 0.2Vdd or less and H level: 0.8Vdd 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.

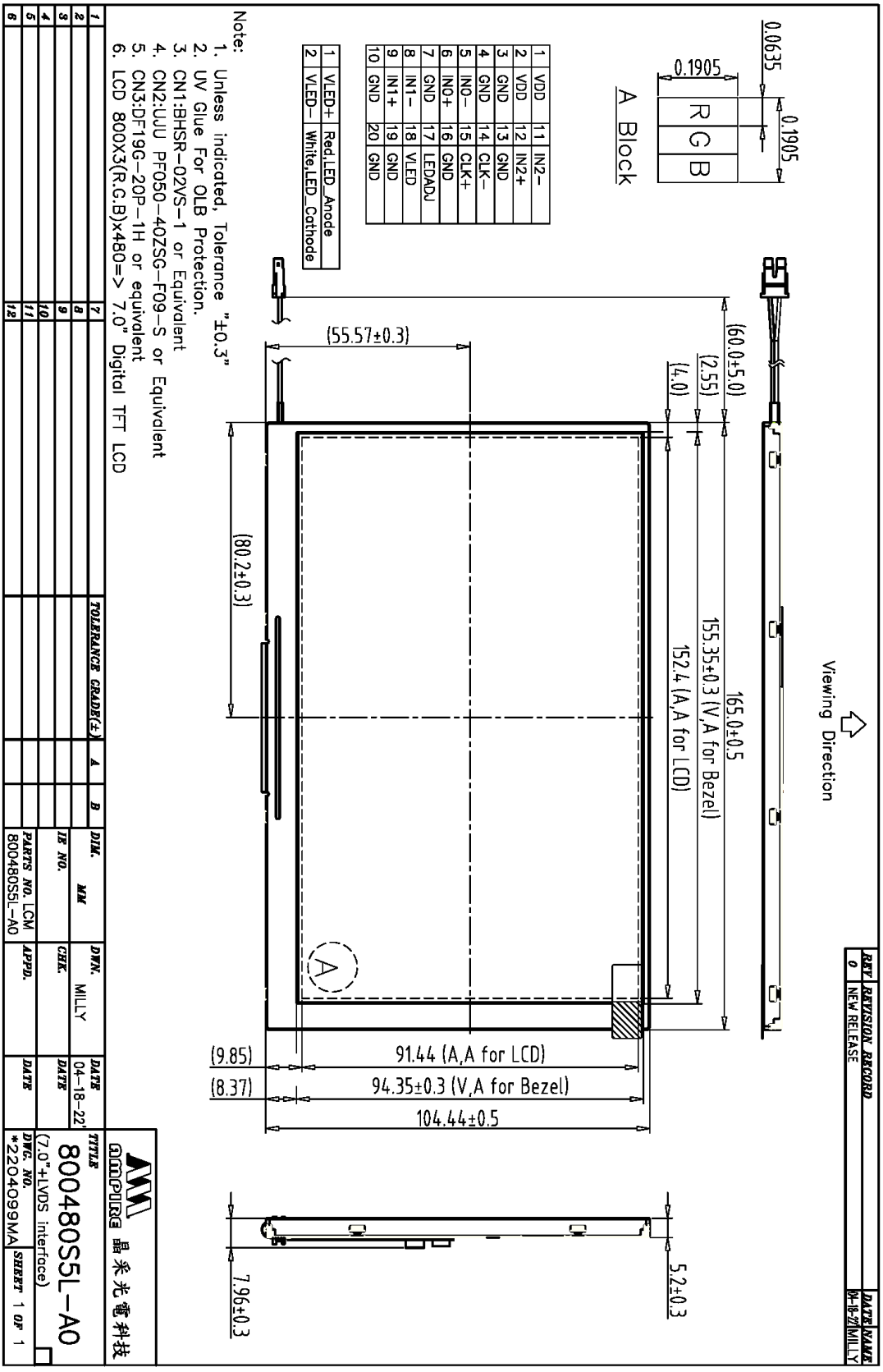
11.5 Other

(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) 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.

(3) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

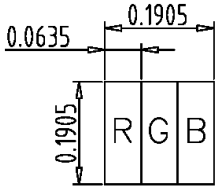
12. Outline Dimension



1	VDD	IN2-
2	VDD	IN2+
3	GND	GND
4	GND	CLK-
5	IN0-	CLK+
6	IN0+	GND
7	GND	LEDADJ
8	IN1-	VLED
9	IN1+	GND
10	GND	GND

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

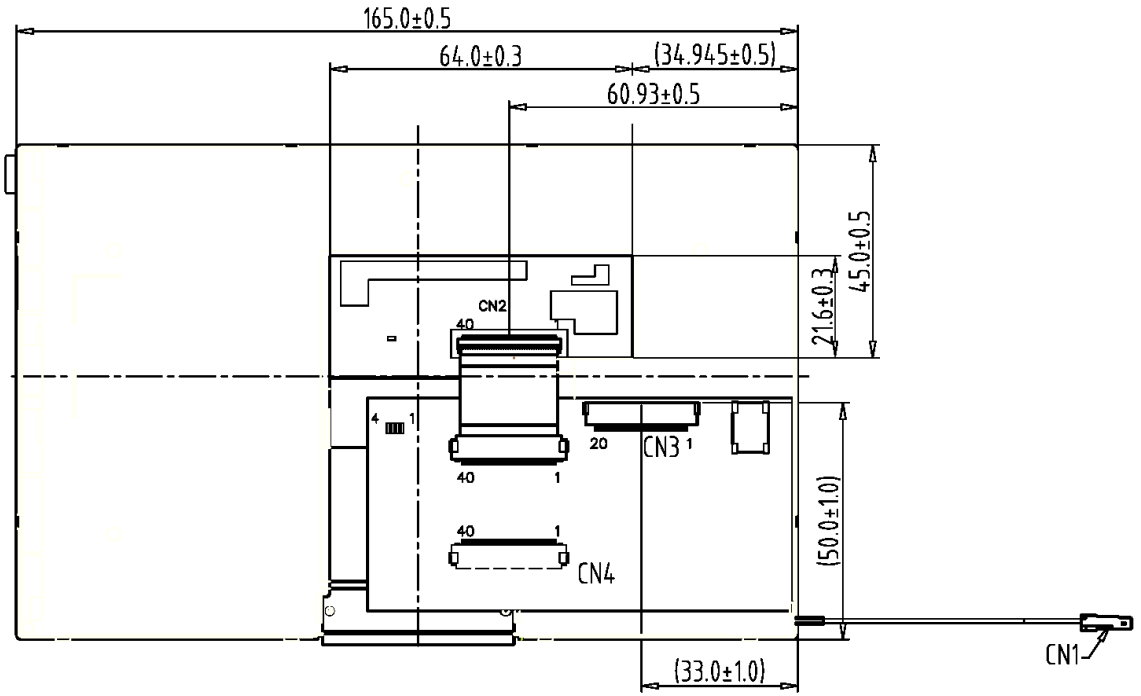
REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	04-18-22	MILLY



A Block

1	VDD	11	IN2−
2	VDD	12	IN2+
3	GND	13	GND
4	GND	14	CLK−
5	IN0−	15	CLK+
6	IN0+	16	GND
7	GND	17	LEDADJ
8	IN1−	18	VLED
9	IN1+	19	GND
10	GND	20	GND

1	VLED+	Red,LED_Anode
2	VLED−	White,LED_Cathode



Back View

Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1:BHSR−02VS−1 or Equivalent
4. CN2:UJU PF050−40ZSG−F09−S or Equivalent
5. CN3:DF19G−20P−1H or equivalent
6. LCD 800X3(R.G.B)x480=> 7.0" Digital TFT LCD

1		7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. MILLY	DATE 04−18−22	TITLE 800480S5L−A0 (7.0"+LVDS interface)
2		8								
3		9					IE NO.	CHK.	DATE	
4		10								
5		11					PARTS NO. LCM−1 800480S5L−A0	APPD.	DATE	DWG. NO. *22040100MA SHEET 1 OF 1
6		12								

晶采光電科技

13. Package
TBD