



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-1024768R2TNQW-04H
Approved by	
Date	

- ☐ Preliminary Specification
☒ Formal Specification

AMPIRE CO., LTD.

4F., No.116, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

新北市汐止區新台五路一段 116 號 4 樓(東方科學園區 A 棟)

TEL:886-2-26967269 , FAX:886-2-26967196 or 26967270

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
2020/08/19	--	New Release	Jessica

1. General Descriptions

1.1 Introduction

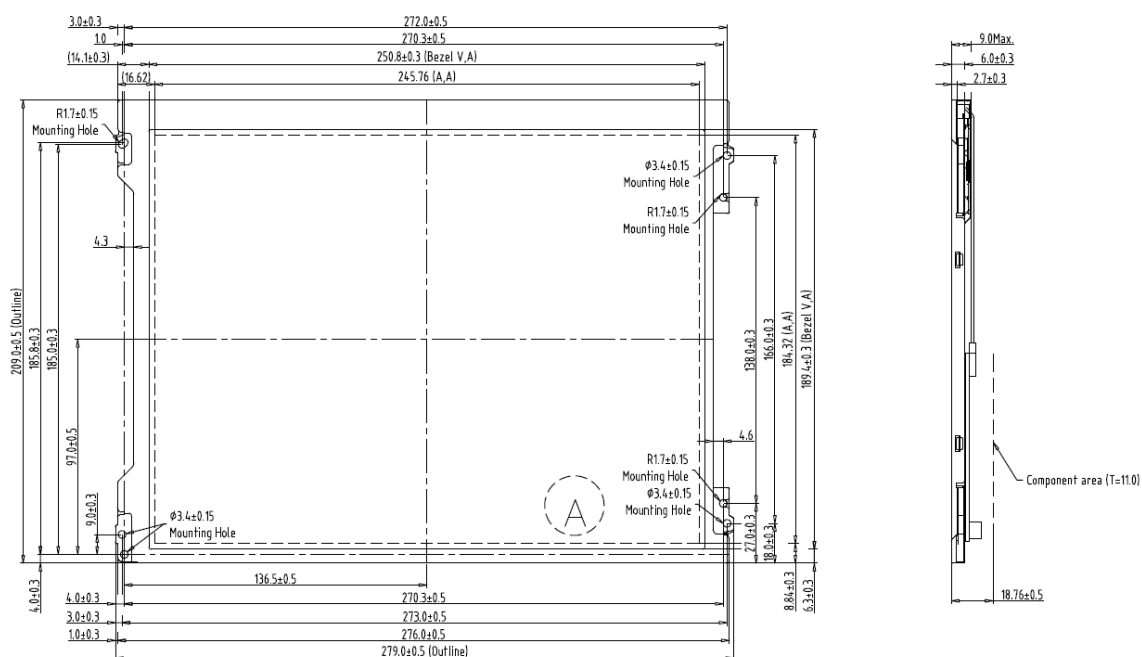
The LCM is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, a backlight system, column driver and row driver circuit. This TFT LCD has a 12.1-inch diagonally measured active display area with resolution (1024 horizontal by 768 vertical pixels array).

1.2 Features

- (1) 12.1" TFT LCD Panel
- (2) LED Backlight System
- (3) [LED driver board](#)
- (4) Supported 1024x768 pixels resolution
- (5) Compatible with RoHS Standard
- (6) Viewing Direction: 6 o'clock (Gray Inversion)

1.3 Product Summary

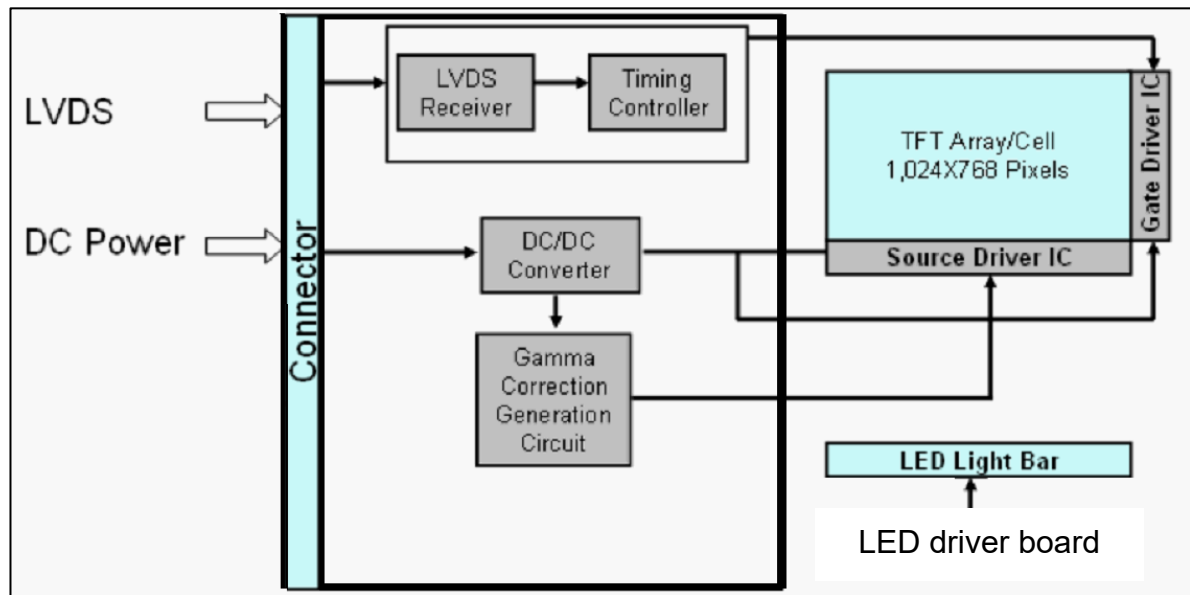
Items	Specifications	Unit
Screen Diagonal	12.1	Inch
Pixel Format	1024(RGB) x768	-
Pixel Pitch	0.24(H) x 0.24(V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
White Luminance	1000 (Typ.)	cd /m2
Contrast Ratio	800 : 1 (Typ.)	-
Response Time	16 (Typ.)	msec
Input Voltage	3.3	V
Electrical Interface (Logic)	LVDS	-
Support Color	16.7M	-
Surface Treatment	Anti-glare & hardness 3H	-



1.4 Functional Block Diagram

Shows the functional block diagram of the LCD module

Figure 1 Block Diagram



2. Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit	Conditions
Supply Voltage	VDD	-0.5	5	V	-
Operating Temperature	TOP	-20	70	°C	Note
Operating Humidity	HOP	10	85	%RH	Note
Storage Temperature	TST	-30	80	°C	Note
Storage Humidity	HST	10	95	%RH	Note

Note (1): Humidity: 85%RH Max. ($T \leq 40^{\circ}\text{C}$) Note static electricity.

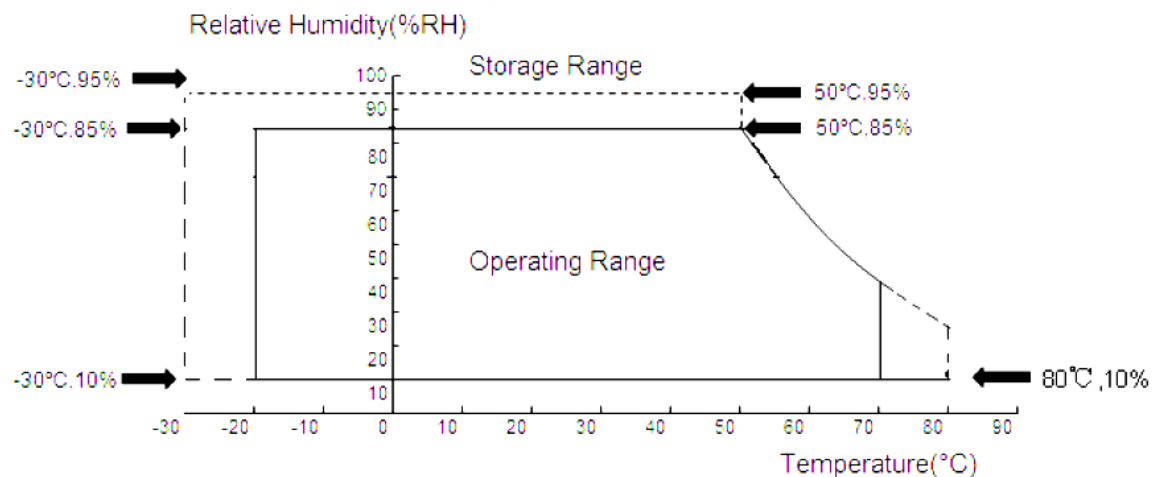
Maximum wet bulb temperature at 39°C or less. ($T > 40^{\circ}\text{C}$) No condensation.

Note (2): There is a possibility of causing deterioration in the irregularity and others of the screen and the display fineness though the liquid crystal module doesn't arrive at destruction when using it at $80 \sim 85^{\circ}\text{C}$ or -20°C .

Note (3): There is a possibility of causing the fineness deterioration by the prolonged use in the (high temperature) humidity environment (60% or more).

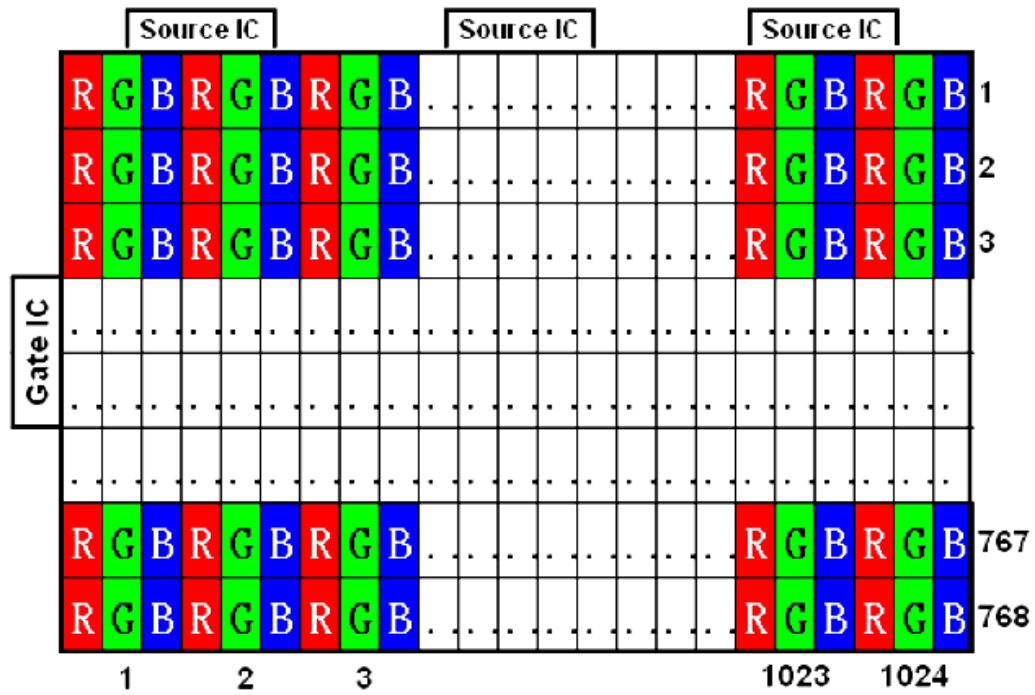
Note (4): In the operating temperature item, the low temperature side is the ambient temperature regulations. The high temperature side is the panel surface temperature regulations.

Note (5): Storage Range&Operating Range Picture:



3. Pixel Format Image

Figure 2 shows the relationship of the input signals and LCD pixel format image.



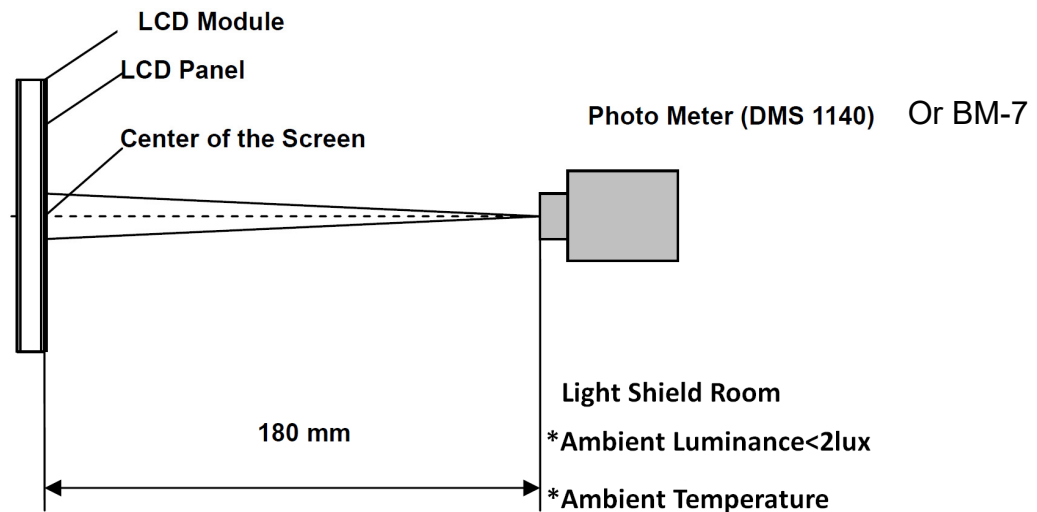
4. Optical Characteristics

The optical characteristics are measured under stable conditions as following notes

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	70	80	-	degree	(1),(2),(3)
		θR	70	80	-		
	Vertical	θT	70	80	-		
		θB	70	80	-		
Contrast Ratio	Center		720	800	-	-	(1),(2),(4)
Response Time	Rising + Falling		-	16	TBD	ms	(1),(2),(5)
Color Chromaticity	Red	x	Typ. -0.03	TBD	Typ. +0.03	-	(1),(2)
	Red	y		TBD		-	
	Green	x		TBD		-	
	Green	y		TBD		-	
	Blue	x		TBD		-	
	Blue	y		TBD		-	
	White	x	0.255	0.305	0.355	-	
	White	y	0.275	0.325	0.375	-	
White Luminance	Center		800	1000	-	cd/m ²	(1),(2),(6)
Luminance Uniformity	9Points		75	80	-	%	(1),(2),(6)
LED Life time	Ta=25℃		-	50k	-	Hrs.	(7)

Note(1) Measurement Setup:

The LCD module should be stabilized at given temperature(25 °C) for 15 minutes to Avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

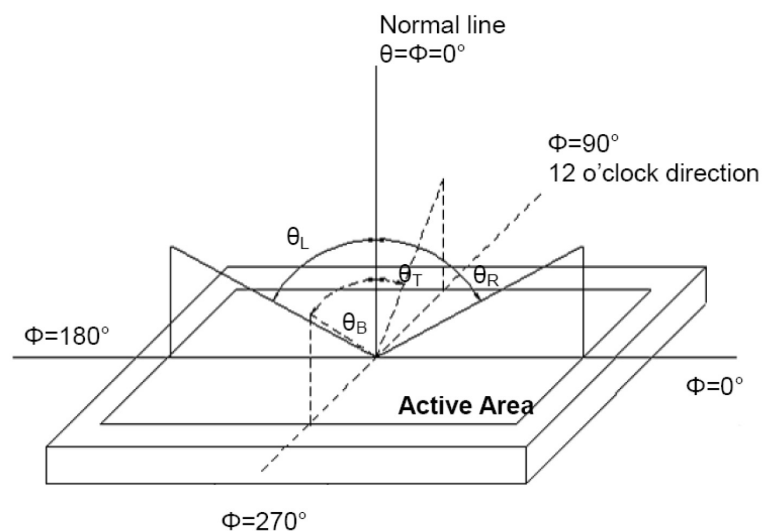


Note(2) The LED input parameter setting as:

VLED: 12V;

PWM_LED: Duty 100 %

Note(3) Definition of Viewing Angle



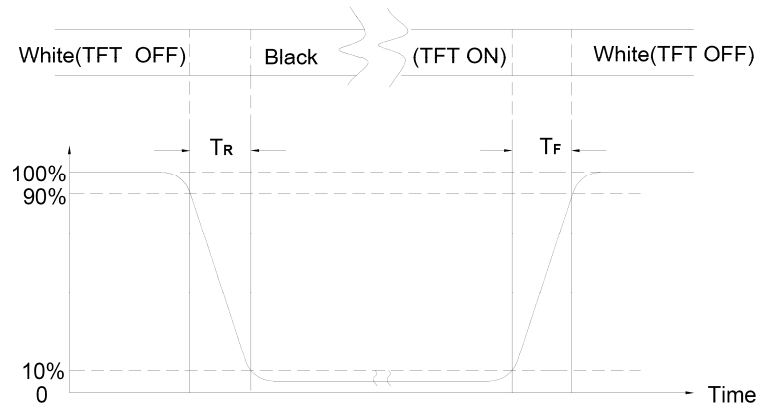
Note(4) Definition Of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

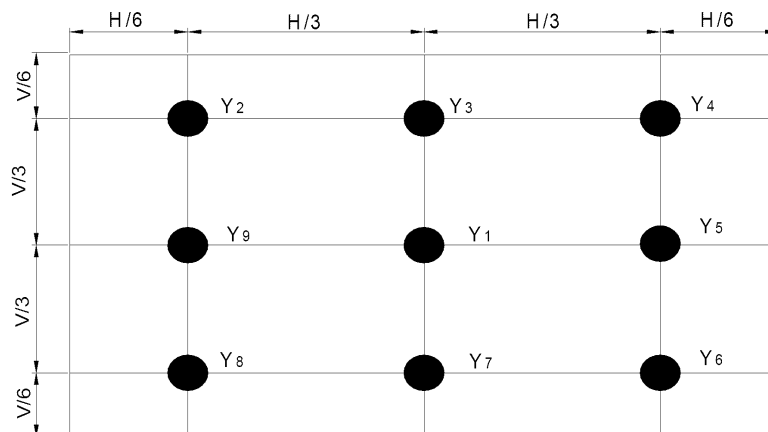
L255: Luminance of gray level 255, L0: Luminance of gray level 0

Note(5) Definition Of Response Time (TR, TF)



Note(6) Definition of Brightness Luminance

$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 5 points})}{(\text{Max Luminance of 5 points})} \times 100\%$$



Note(7) Condition: $T_a=25^{\circ}\text{C}$, continuous lighting

Life time is estimated data.

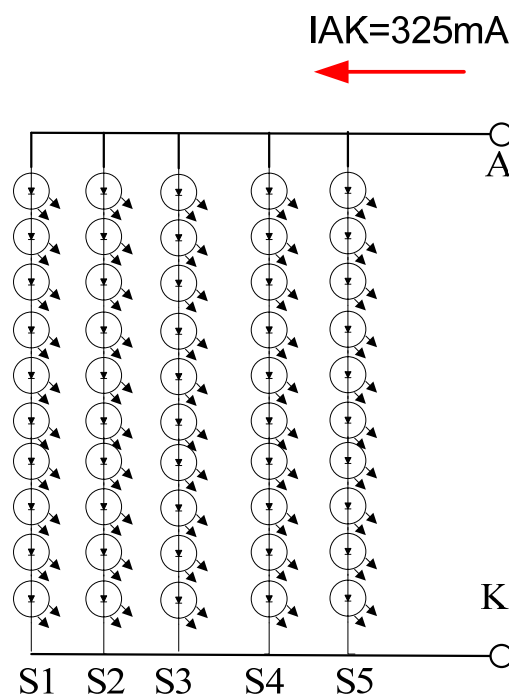
Definitions of failure:

1. LCM brightness becomes half of the minimum value.
2. LED doesn't light normally.

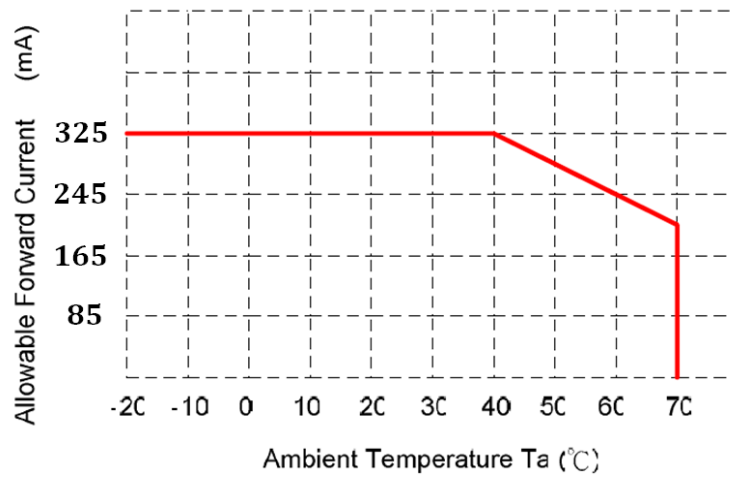
5. Backlight Characteristics

Electrical characteristic of LED Back-light

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
LED Driver Power Voltage	VIN	12	-	15	V	
LED Driver Power Current	IVIN(VIN=12V)	--	TBD	--	mA	Ta=25°C
ADJ frequency	ADJ	100	--	1K	Hz	
ADJ logic level High	VIH	2.0	--	5	V	
ADJ logic level Low	VIL	--	--	0.8	V	
Input voltage for LED_EN signal	LED_EN_H	2	-	5	V	
	LED_EN_L	-0.3	-	0.8	V	
LED voltage	VAK	--	33	--	V	IAK=325mA, Ta=25°C
LED forward current	IAK	--	325	--	mA	Ta=25°C



Note(1) When LCM is operated over 40°C ambient temperature, the IAK should be follow :



6. Electrical Characteristics

6.1 TFT LCD Module Interface Connector

Item	Description
Type / Part Number	MSB240420HE

Pin #	Signal Name	Description	Remarks
1	VDD	Power Supply, 3.3V (typical)	-
2	VDD	Power Supply, 3.3V (typical)	-
3	VSS	GND	-
4	REV	Reverse Scan selection	1*
5	Rin1-	-LVDS differential data input	
6	Rin1+	+LVDS differential data input	
7	VSS	GND	
8	Rin2-	-LVDS differential data input	
9	Rin2+	+LVDS differential data input	
10	VSS	GND	
11	Rin3-	-LVDS differential data input	
12	Rin3+	+LVDS differential data input	
13	VSS	GND	
14	CLKIN-	-LVDS differential data input	
15	CLKIN+	+LVDS differential data input	
16	GND	GND	
17	Rin4-	-LVDS differential data input	
18	Rin4+	+LVDS differential data input	
19	SEL68	6/8 bits LVDS data input selection(H:8bit L/NC:6bit)	
20	Bist	Internal use	

Note(1) About REV Please refer;

Note(2) All input signals shall be low or Hi-resistance state when VDD is off.

6.2 LED driver board

Pin	Name	I/O	Description
1	VIN	P	Voltage for LED circuit
2	LED_EN	I	LED BLU (Backlight unit) ON/OFF. High level: ON; Low level: OFF.
3	GND	P	Power ground
4	PWM	I	Adjust the LED brightness by PWM

Note: I/O definition:

I-----Input P----Power/Ground

7. Interface Timings

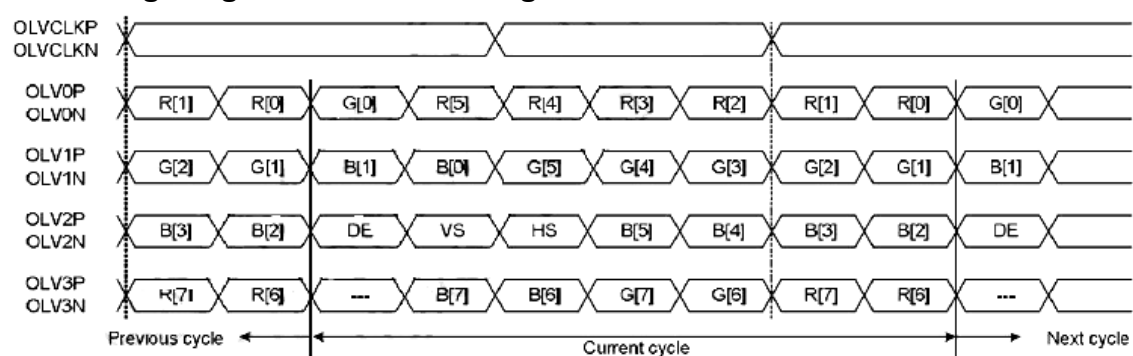
7.1 Timing Characteristics

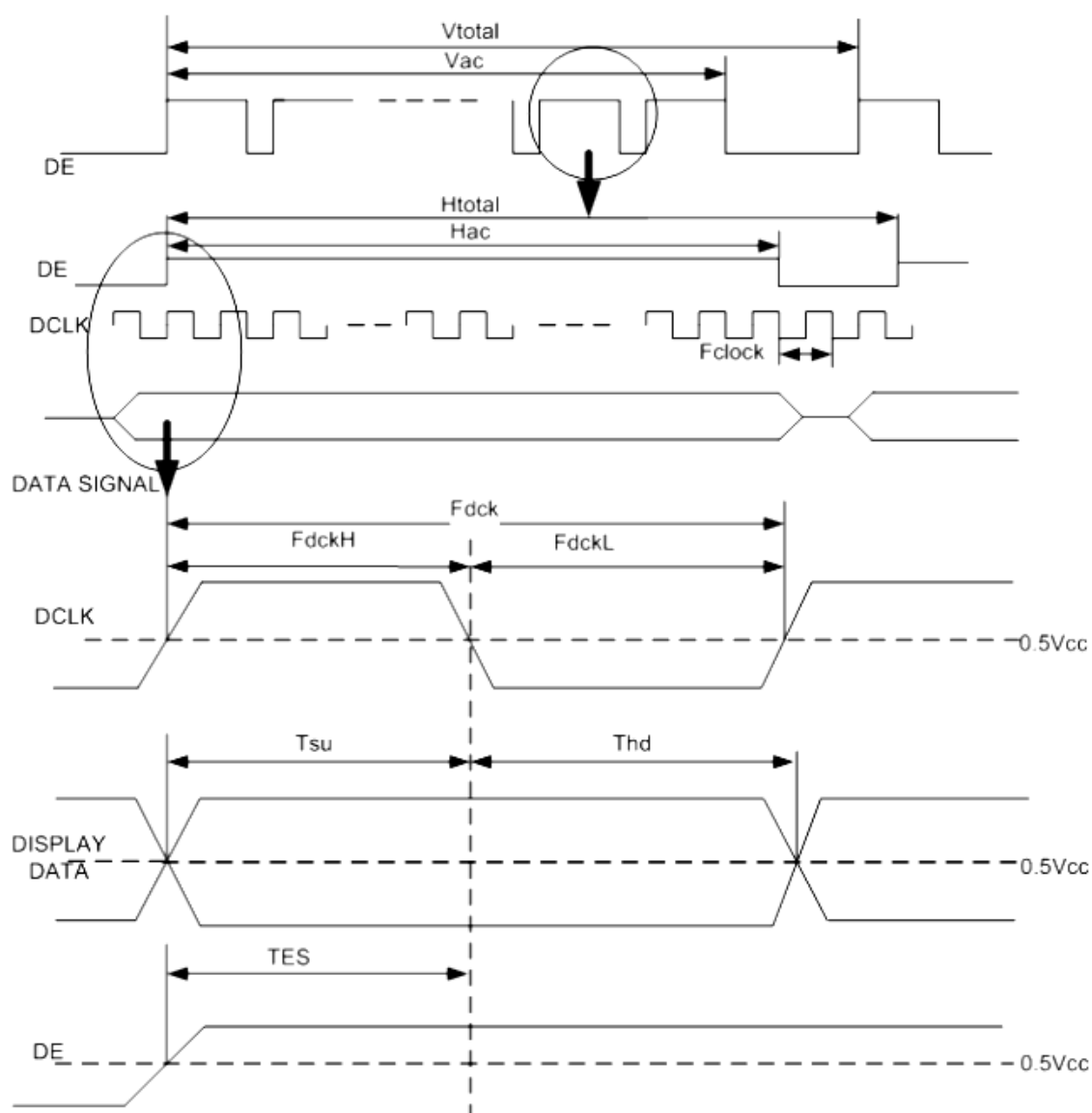
Parameter	Symbol	Unit	Min.	Typ.	Max.
LVDS Clock Frequency	Fclk	MHz	50	65	80
H Total Time	HT	Clocks	1100	1344	2047
H Active Time	HA	Clocks	1024	1024	1024
H Blanking Time	HBL	Clocks	76	320	1023
V Total Time	VT	Lines	776	806	1023
V Active Time	VA	Lines	768	768	768
V Blanking Time	VBL	Lines	8	38	255
Frame Rate	Vsync	Hz	-	60	-

Note(1) Synchronization Method: DE only

Note(2) H Blank area and V Blank area can not be changed at every frame

7.2 Timing Diagram of Interface Signal





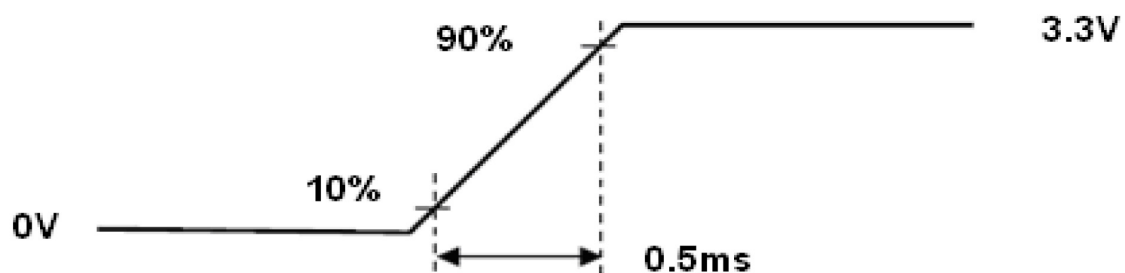
8. Power Consumption

Input power specifications are as follows.

Item		Symbol	Min.	Typ.	Max.	Units
LCD Drive Voltage (Logic)		VDD	3.0	3.3	3.6	V
VDD Current	Black Pattern	IDD	-	-	250	mA
VDD Power Consumption	Black Pattern	PDD	-	-	0.825	W
Rush Current		Irush	-	-	3	A
Allowable Logic/LCD Drive Ripple Voltage		VDDrp	-	-	200	mV

Note(1) Measure Condition

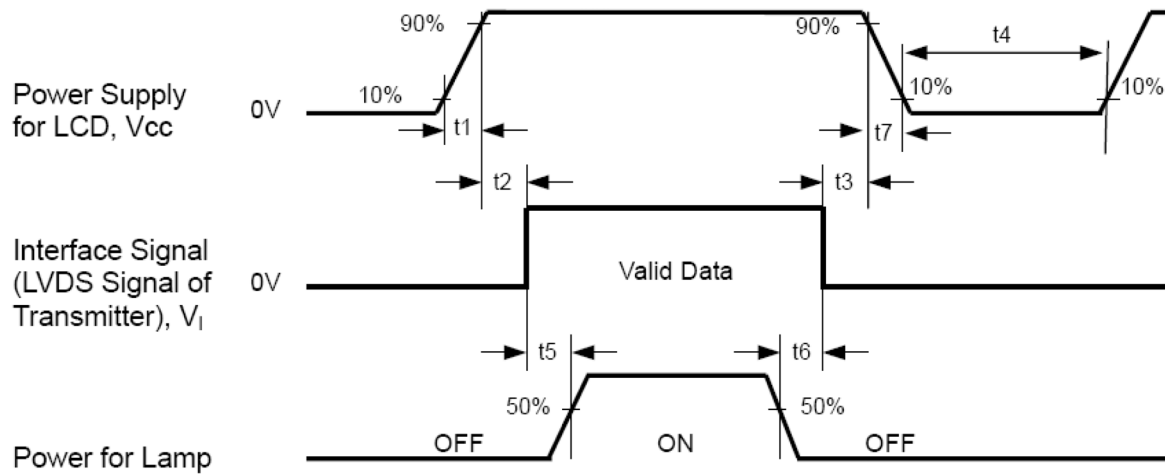
Figure 9 VDD rising time



VDD rising time

9. Power ON/OFF Sequence

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



Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	-	-	[ms]
T4	10	-	-	[ms]
T5	10	-	-	[ms]
T6	0	-	-	[ms]
T7	10	-	-	[ms]
T8	100	-	-	[ms]
T9	0	16	50	[ms]
T10	-	-	10	[ms]
T11	1000	-	-	[ms]

10. Use Precautions

10.1 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.

10.2 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. $1\text{M}\Omega$ 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.

10.3 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.

10.4 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.

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

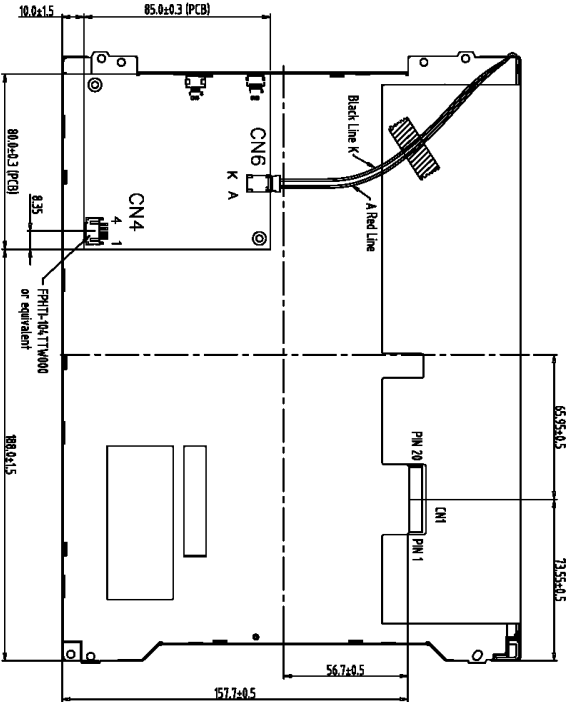
Date: 2020/08/19



REV	REVISION RECORD	DATE NAME
0	NEW RELEASE	08-17-20SNOW

CN4	
1	VIN
2	LED_EN
3	GND
4	PWM

CN1	
1	VDD
2	VDD
3	VSS
4	REV
5	Rin1-
6	Rin1+
7	VSS
8	Rin2-
9	Rin2+
10	VSS
11	Rin3-
12	Rin3+
13	VSS
14	CLKIN-
15	CLKIN+
16	GND
17	Rin4-
18	Rin4+
19	SEL66
20	Bist



Back View

Note:
1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.

1	1024768R2	7		TOLERANCE GRADE (C)	A	B	DIM.	MM	DWN.	SNOW	DATE	DATE	TITLE	Q101P101R3	晶采光电科技
2	1280800Q1-04	8					IE NO.		CHK.		DATE		1024768R2-04		
3		9					PARTS NO.	1024768R2-04	APPD.		DATE		DWG. NO.	*200869MA	SHEET 1 OF 1
4		10													
5		11													
6		12													

12. Package

TBD