



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-1024600K5TMQW-11H
Approved by	
Date	

☒ Preliminary Specification


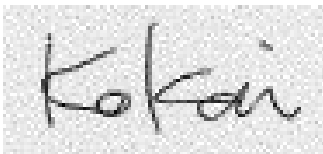

☐ Approved Specification

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## RECORD OF REVISION

Revision Date	Page	Contents	Editor
2018/3/5	--	New Release	Jessica

## 1. Features

7 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 7" TFT-LCD panel, LED backlight, LED driver unit and power circuit unit.

- (1) Construction: 7" a-Si TFT active matrix, White LED Backlight and power & LED driver.
- (2) Resolution (pixel): 1024(R.G.B) X600
- (3) Number of the Colors : 16.7M colors ( R , G , B 8 bit digital each)
- (4) LCD type : Transmissive , normally White
- (5) Interface: LVDS 8bit
- (6) Viewing Direction: 6 O'clock (Gray Inversion)

## 2. Physical Specifications

Item	Specifications	Unit
LCD size	7 inch (Diagonal)	
Resolution	1024 x 3(RGB) x 600	dot
Dot pitch	0.15(W) x 0.15(H)	mm
Active area	153.6(W) x 90.0(H)	mm
Module size	165. 5(W) x 104.44(H) x 7.41(D)	mm
Surface treatment	Anti-Glare	
Color arrangement	RGB-stripe	
interface	LVDS	
Brightness	1000	cd/m <sup>2</sup>
Weight	TBD	g

### 3. Absolute Max. Ratings

Item	Symbol	Values		Unit	Note
		Min.	Max.		
Power voltage	VDD	-0.3	4.2	V	
	VLED	-0.3	14		
Operation temperature	TOP	-30	80	°C	
Storage temperature	TST	-30	80	°C	

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

## 4. Electrical Characteristics

### 4-1 Typical Operation Conditions

Item		Symbol	Values			Unit	Remark
			Min.	Typ.	Max.		
Power Voltage		VDD	3.0	3.3	3.6	V	Note(1),(2)
Power Consumption		IDD	--	150	--	mA	Note(1),(2) VDD=3.3V
Logic Input Voltage	Input Voltage	VIN	0	-	VDD	V	
	Logic input high voltage	VTH	0.7*VDD	-	VDD	V	Note(3)
	Logic input low voltage	VTL	GND	-	0.3*VDD	V	Note(3)

Note(1) Value for Power Board combined panel.

Note(2) VDD setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note(3) LVDS.

## 4-2 LED Driving Conditions

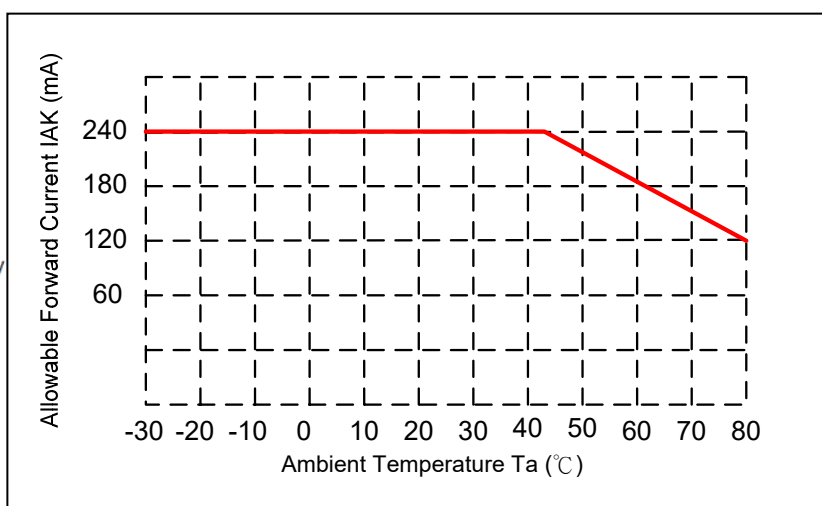
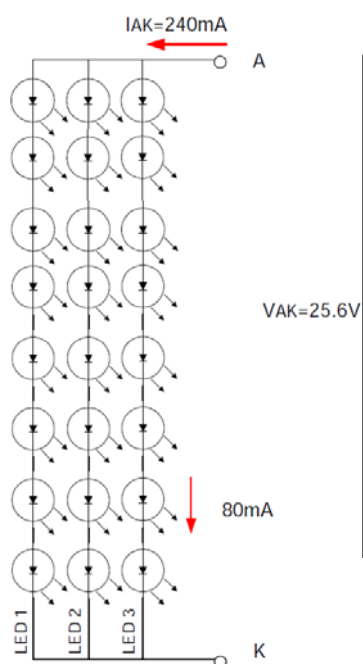
Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED Driver Power Voltage	VLED	9	12	14	V	
LED Driver Current Consumption	ILED	--	730	--	mA	VLED=12V ADJ=5V (duty 100%)
ADJ Input Voltage	VADJ-IH	1.2	--	VLED	V	duty=100% Note(3)
	VADJ-IL	0	--	0.5	V	
LED voltage	VAK	24.8	25.6	26.4	V	Note(1)
LED forward Current	IAK	--	240	--	mA	Ta=25°C
LED life time	--	--	50,000	--	Hr	Note(2)

Note(1) Constant current source is needed for white LED back-light driving. When LCM is operated over 40°C ambient temperature, the IBL should be follow :

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

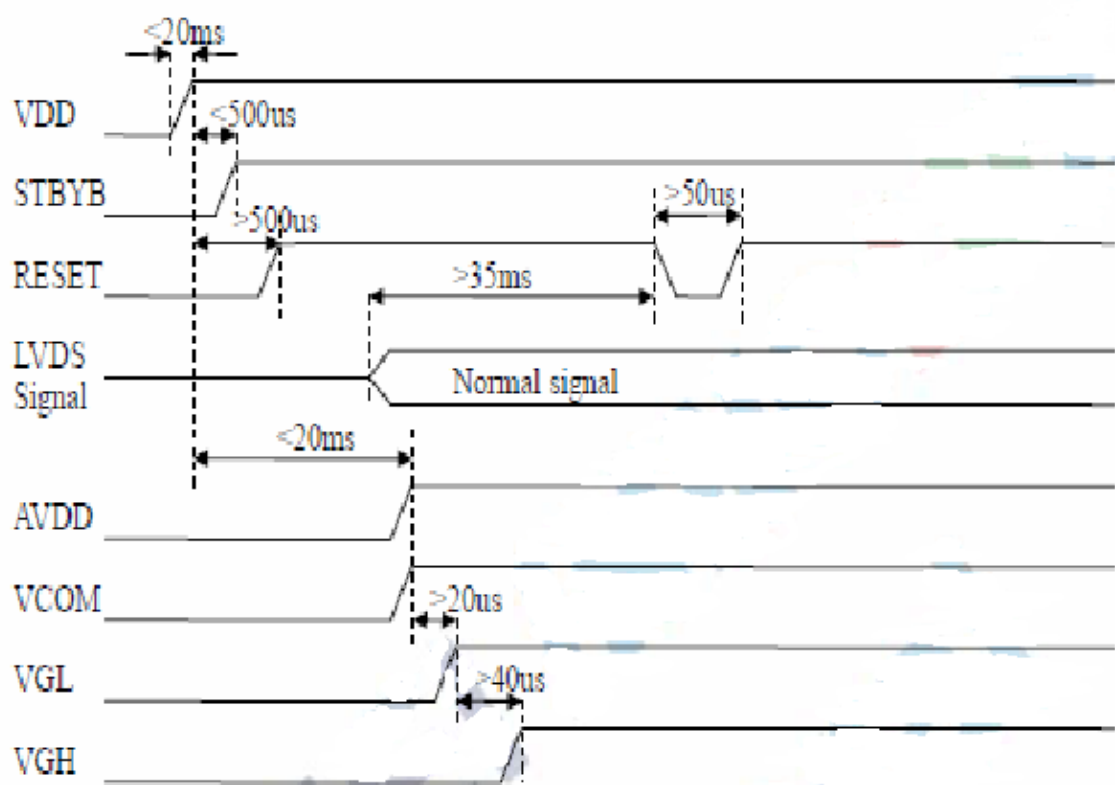
Note(3) VLEDADJ is PWM signal input. It is for brightness control.

There are 3 Groups LED shown as below, VAK =25.6V, IAK =240mA.

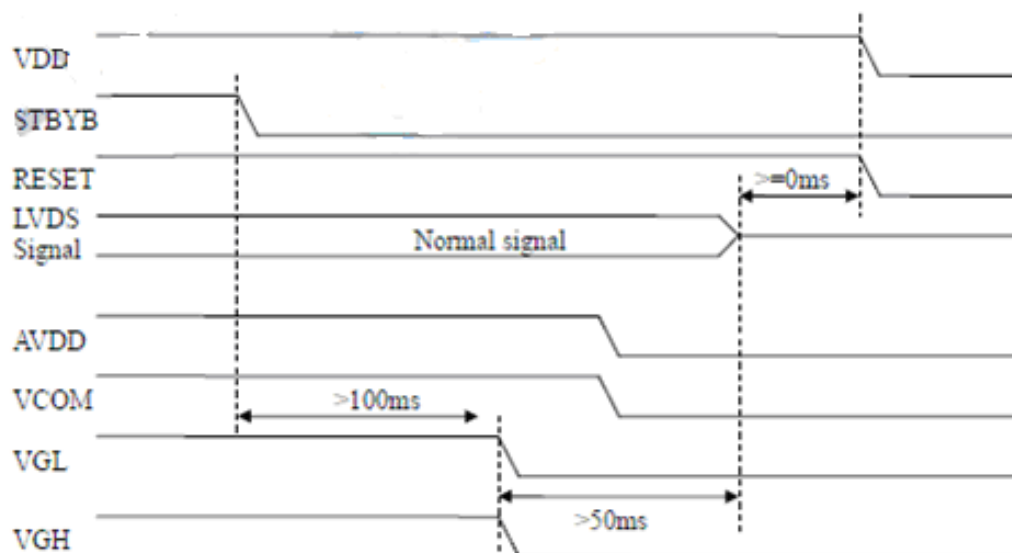


### 4-3 Power Sequence

#### a. Power on:



#### b. Power off:



## 5. Optical Specifications

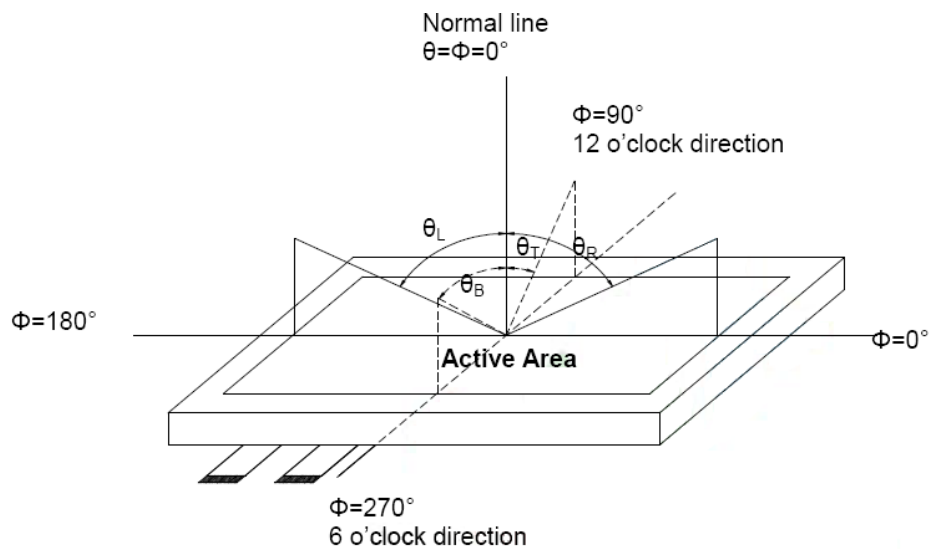
Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Viewing angle ( $CR \geq 10$ )	$\theta_L$	$\Phi = 180^\circ$ (9 o'clock)	65	75	--	degree	Note(1)
	$\theta_R$	$\Phi = 0^\circ$ (3 o'clock)	65	75	--		
	$\theta_T$	$\Phi = 90^\circ$ (12 o'clock)	65	70	--		
	$\theta_B$	$\Phi = 270^\circ$ (6 o'clock)	65	75	--		
Response time	TON	Normal $\theta = \Phi = 0^\circ$	--	20	30	msec	Note(3)
	TOFF		--	20	30	msec	
Contrast ratio	CR		500	700	--	--	Note(4)
Color chromaticity	WX		0.249	0.299	0.349	--	Note(5)
	WY		0.273	0.323	0.373	--	Note(6)
Luminance	L		800	1000	--	cd/m <sup>2</sup>	Note(6)

Test Conditions:

1. VLED = 12V, IAK= 240mA (Backlight current), the ambient temperature is 25°C.
2. The test systems refer to Note (2).

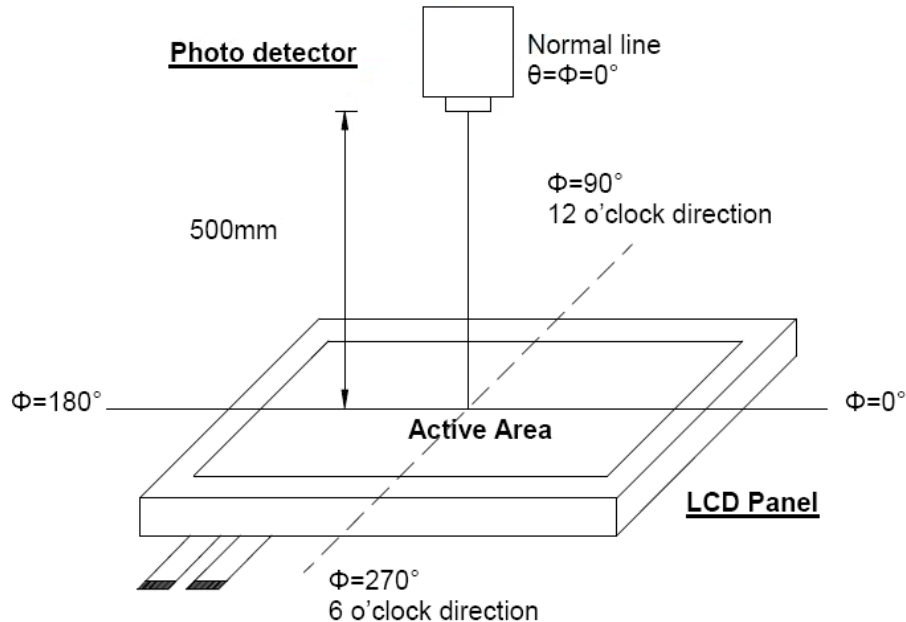


Note(1) Definition of viewing angle range



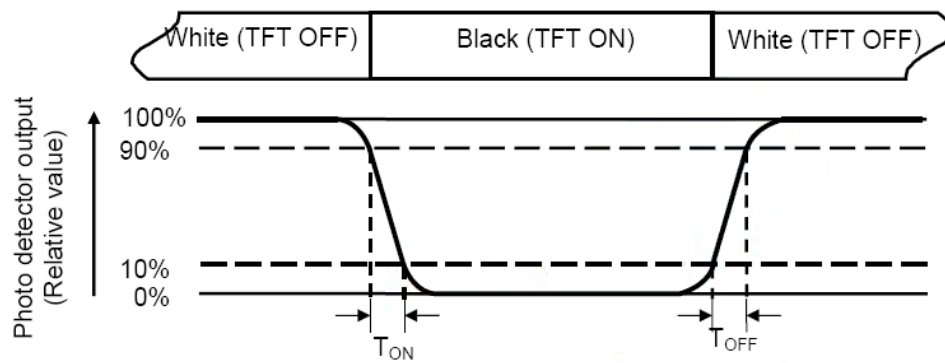
Note(2) Definition of optical measurement system.

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:  $1^\circ$  / Height: 500mm.)



Note(3) 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%.



Note(4) Definition of contrast ratio

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

Note(5) Definition of color chromaticity (CIE1931)

Color coordinated measured at center point of LCD.

Note(6) All input terminals LCD panel must be ground when measuring the center area of the panel.

## 6. Interface

### CN2

Pin No.	Symbol	I/O	Description	Note
1	VDD	P	Power Voltage for Logic: 3.3V	
2	VDD	P	Power Voltage for Logic: 3.3V	
3	GND	I	Ground	
4	GND	I	Ground	
5	IN0-	I	- LVDS differential data input	
6	IN0+	I	+ LVDS differential data input	
7	GND	P	Ground	
8	IN1-	I	- LVDS differential data input	
9	IN1+	I	+ LVDS differential data input	
10	GND	P	Ground	
11	IN2-	I	- LVDS differential data input	
12	IN2+	I	+ LVDS differential data input	
13	GND	P	Ground	
14	CLK-	I	- LVDS differential data input	
15	CLK+	I	+ LVDS differential data input	
16	GND	P	Ground	
17	IN3-	I	- LVDS differential data input	
18	IN3+	I	+ LVDS differential data input	
19	VLED	P	Power supply for backlight: 12V	
20	ADJ	I	LED PWM signal	(1)

I: input, O: output, P: power

**CN3**

Pin No.	Symbol	I/O	Description	Note
1	VLED	P	Power supply for backlight:12V	
2	GND	P	Ground	
3	NC		No Connect	
4	ADJ	P	LED PWM signal	
5	NA		No Connect	

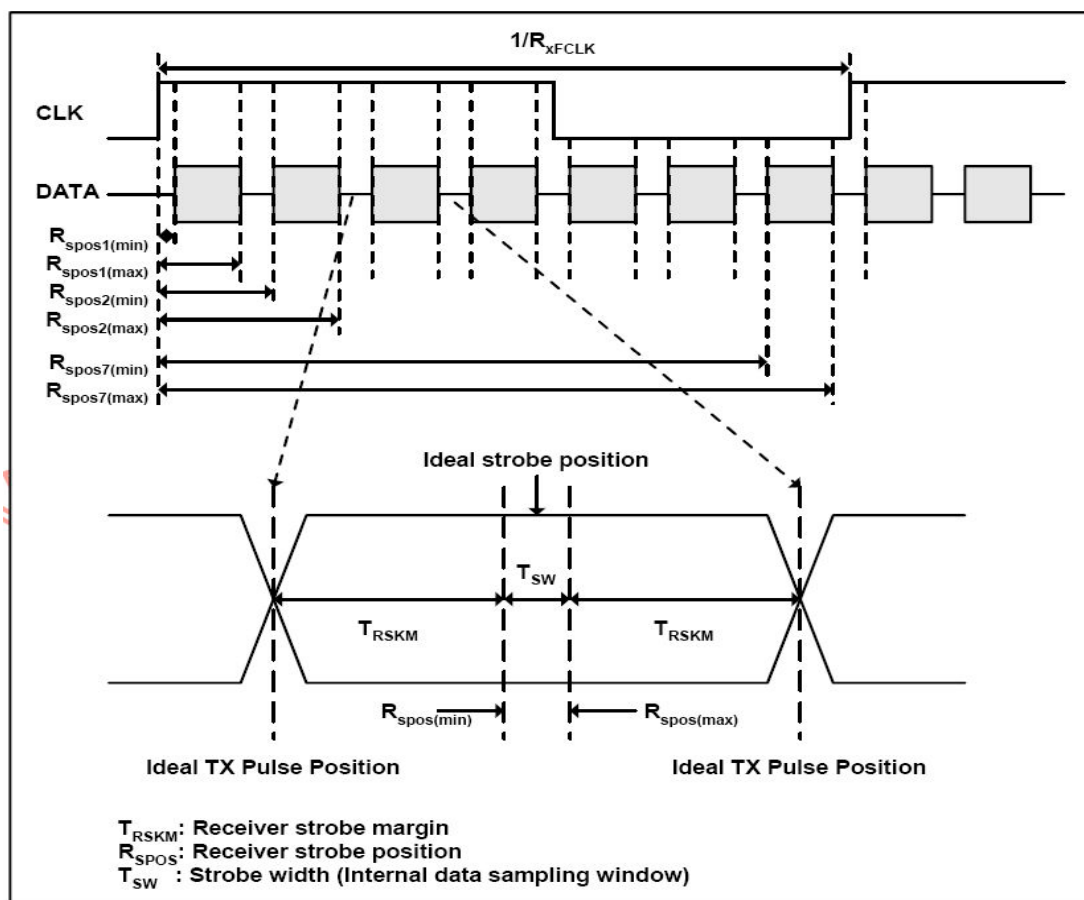
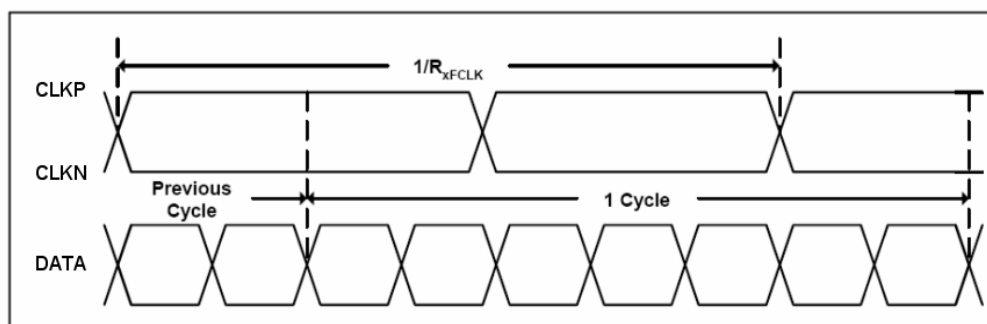
Note(1) ADJ is PWM signal input. It is for brightness control.

Item	Symbol	Min.	Typ.	Max.	Unit
ADJ signal frequency	fPWM	10	--	100	KHz
ADJ signal logic level High	VIH	1.2	--	VLED	V
ADJ signal logic level Low	VIL	0	--	0.5	V

## 7. Timing Characteristics

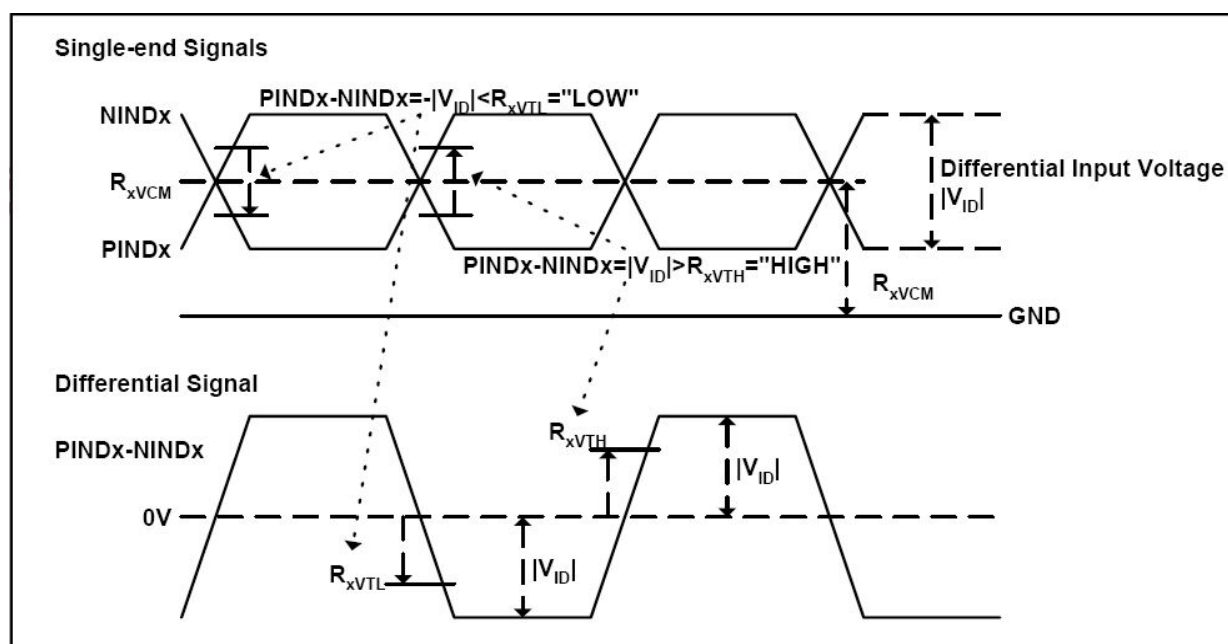
### 7-1 AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock frequency	$R_{xFCLK}$	40.8	51.2	71		
Input data skew margin	$T_{RSKM}$	500	--	--		
Clock high time	$T_{LVCH}$	--	$4/(7 * R_{xFCLK})$	--		
Clock low time	$T_{LVCL}$	--	$3/(7 * R_{xFCLK})$	--		



## 7-2 DC Electrical Characteristics

Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Differential input high Threshold voltage	$R_{xVTH}$	-	-	+0.1	V	$R_{xVCM}=1.2V$
Differential input low Threshold voltage	$R_{xVTH}$	-0.1	-	-	V	
Input voltage range (singled-end)	$R_{xVIN}$	0	-	2.4	V	
Differential input common mode voltage	$R_{xVCM}$	$ V_{ID} /2$	-	$2.4- V_{ID} /2$	V	
Differential voltage	$ V_{ID} $	0.2	-	0.6	V	
Differential input leakage current	$RV_{xliz}$	-10	-	+10	uA	

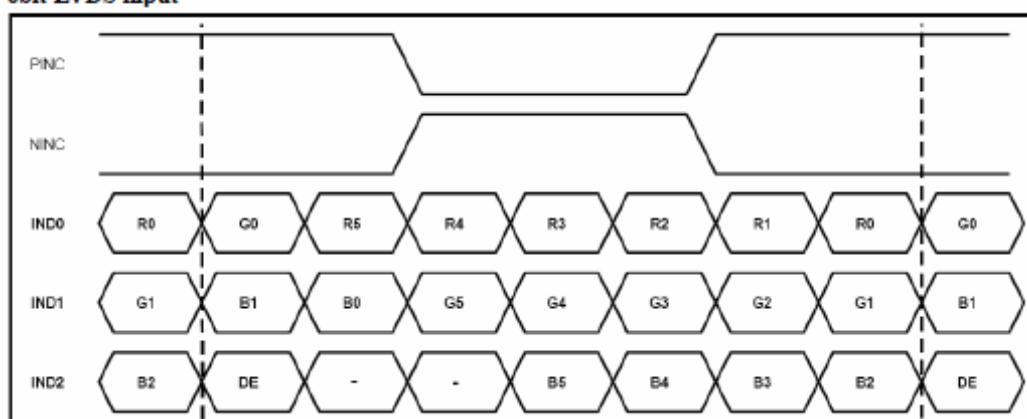


### 7-3 Timing

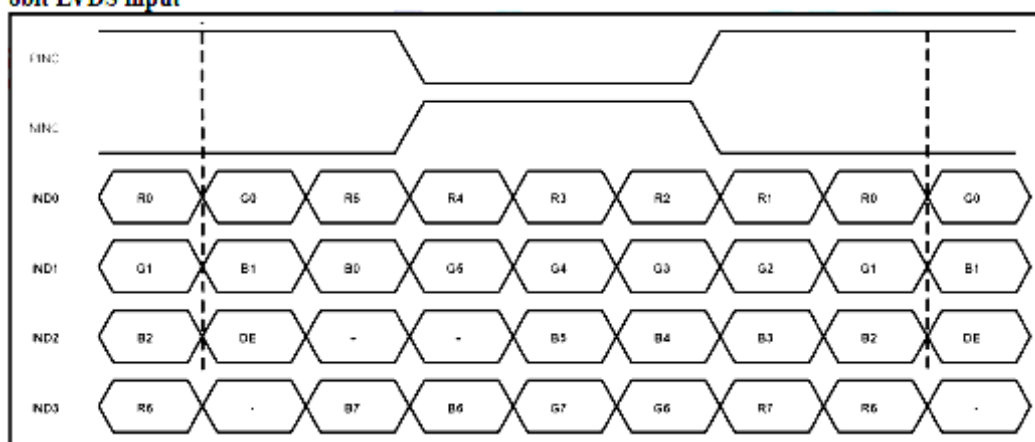
Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Clock Frequency	fclk	40.8	51.2	67.2	MHz	Frame rate =60Hz
Horizontal display area	thd	1024			DCLK	
HS period time	th	1114	1344	1400	DCLK	
HS Blanking	thb	90	320	376	DCLK	
Vertical display area	tvd	600			H	
VS period time	tv	610	635	800	H	
VS Blanking	thb	10	35	200	H	

**Default setting: 6bits LVDS input. (JP2 on PCBA)**

**6bit LVDS input**



**8bit LVDS input**





## 8. Reliability Test Conditions

(Note 3)

Item	Test Conditions	Note
High Temperature Storage	Ta = 80℃ 240 hrs	Note(1),(4)
Low Temperature Storage	Ta = -30℃ 240 hrs	Note(1),(4)
High Temperature Operation	Ta = 80℃ 240 hrs	Note(2),(4)
Low Temperature Operation	Ta = -30℃ 240 hrs	Note(1),(4)
Operate at High Temperature and Humidity	+60℃, 90%RH 240 hrs	
Thermal Shock	-30℃ /30 min ~ +80℃ /30 min for a total 100 cycles, Start with cold temperature and end with high temperature	

Note(1) Ta is the ambient temperature of samples.

Note(2) Ts is the temperature of panel's surface.

Note(3) 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.

Note(4) Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

## **9. General Precautions**

### **9-1 Safety**

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

### **9-2 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.

### **9-3 Static Electricity**

- (1) It needs to be sure to ground module before turning on power or operation module.
- (2) Do not apply voltage which exceeds the absolute maximum rating value.

### **9-4 Storage**

- (1) Store the module in a dark room where must keep at  $+25\pm 10^{\circ}\text{C}$  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.

### **9-5 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.

### **9-6 Others**

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



