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-03H
APPROVED BY	
DATE	

☐Approved For Specifications
☐ Approved For Specifications & Sample

AMPIRE CO., LTD.
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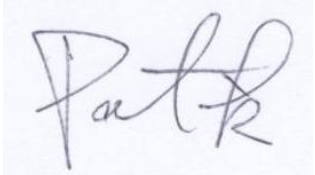
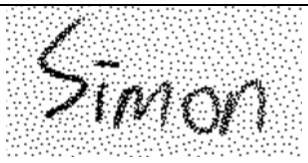
APPROVED BY	CHECKED BY	ORGANIZED BY
		

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2015/10/20	--	New Release	Emil

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, and LED driver 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 : 16M colors (R , G , B 6 bit digital each)
(4) LCD type : Transmissive , normally White
(5) Interface: LVDS interface 6bit (default), 8bit by jumper setting.
(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 5(D)	mm
Surface treatment	Hard Coating, Glare	
Color arrangement	RGB-stripe	
interface	LVDS	
Brightness	500	cd/m^2
Weight	TBD	g

3. ABSOLUTE MAX. RATINGS

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power voltage	VCC	-0.3	4.2	V	
	AVDD	6.5	13.5		
	VGH	-0.3	20		
	VGL	-20	0.3		
Backlight Forward Current	ILED	-	80	mA	For each LED dice
Operation temperature	TOP	-20	70	℃	
Storage temperature	TST	-30	80	℃	

The following values are maximum operation conditions, if 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		V_{CC}	3.0	3.3	3.6	V	Note 1,2
		AVDD	10.8	11	12	V	
		VGH	15.7	16	16.3	V	
		VGL	-7.1	-6.8	-6.5	V	
		VCOM	3.45	3.55	3.65	V	
Power Consumption		I_{CC}	--	150	--	mA	Note 1,2 VCC=3.3V
		IAVDD	--	33	50	mA	
		IVGH	--	0.4	1	mA	
		IVGL	--	0.4	1	mA	
Logic Input Voltage	Input Voltage	V_{IN}	0	-	V_{CC}	V	
	Logic input high voltage	V_{TH}	$0.7V_{CC}$	-	V_{CC}	V	Note 3
	Logic input low voltage	V_{TL}	GND	-	$0.3V_{CC}$	V	Note 3

Note 1: Value for Power Board combined panel.

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

Note 3: LVDS.

4-2 LED Driving Conditions

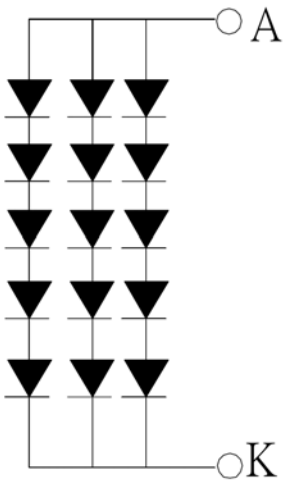
Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED voltage	V_{AK}	14	--	18	V	Note(1)
LED forward Current	I_{AK}	--	180	--	mA	Ta=25℃
LED life time	--	--	30,000	--	Hr	Note(2)

Note (1) The constant current source is needed for white LED back-light driving.
When LCM is operated over 60 deg.C ambient temperature, the I_{LED} of the LED back-light should be adjusted .

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

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

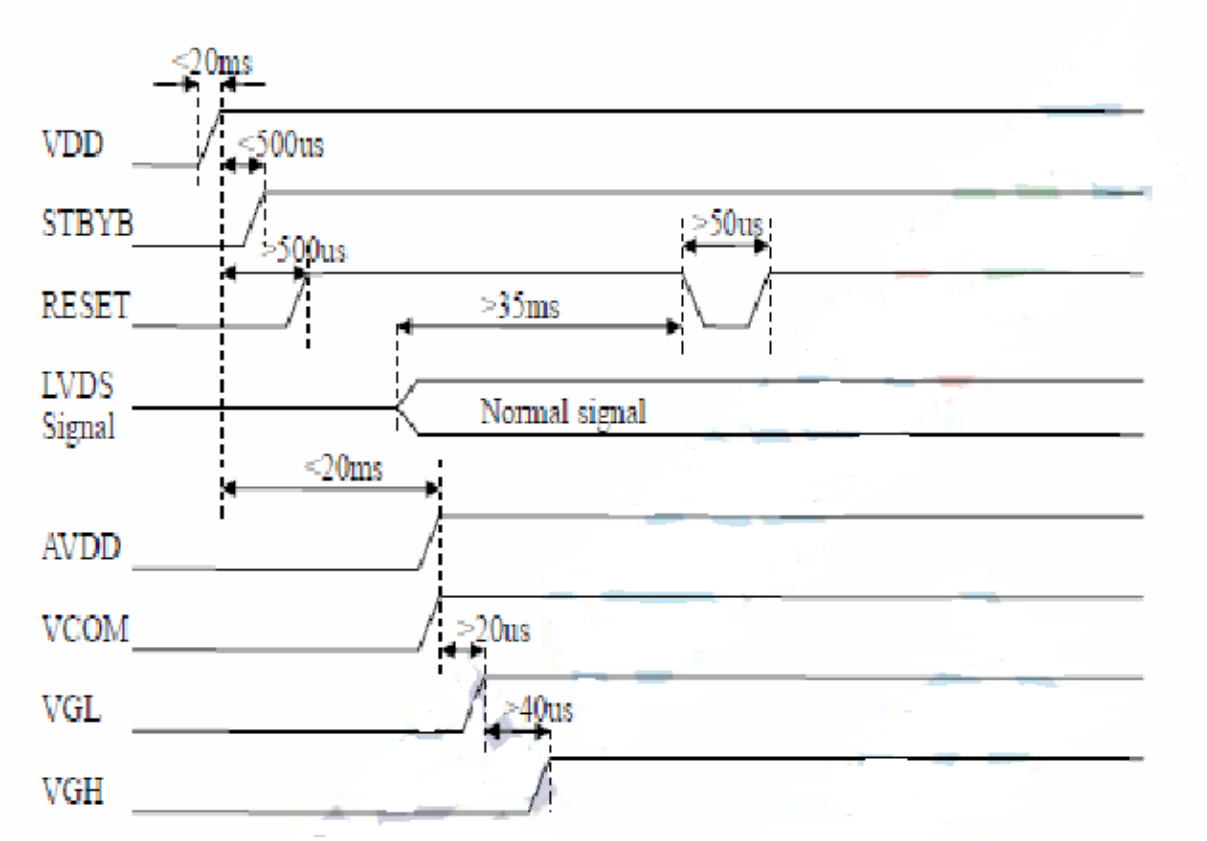
There are 3 Groups LED shown as below , V_{AK} =16.5V , I_{AK} =180mA.



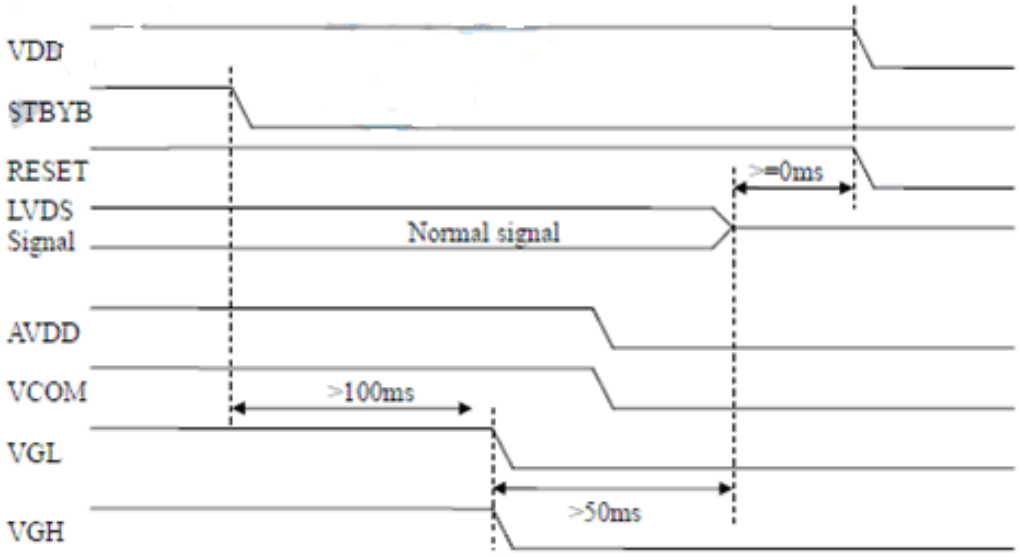
Brightess to be decreased to 50% of the initial value.

4-3 Power Sequence

a. Power on:



b. Power off:



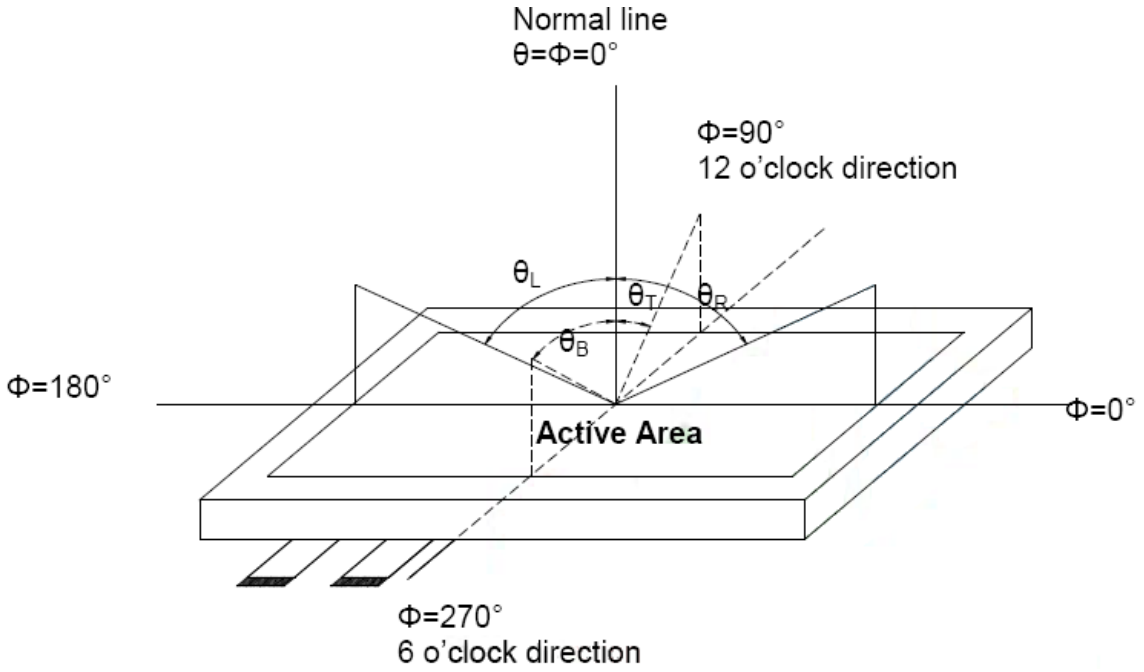
5. Optical Specifications

Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Viewing angle (CR≧10)	θ L	Φ = 180° (9 o'clock)	65	75	--	degree	Note1
	θ R	Φ = 0° (3 o'clock)	65	75	--		
	θ T	Φ = 90° (12 o'clock)	65	70	--		
	θ B	Φ = 270° (6 o'clock)	65	75	--		
Response time	TON	Normal θ =Φ=0°	--	20	30	msec	Note3
	TOFF		--	20	30	msec	
Contrast ratio	CR		500	700	--	--	Note4
Color chromaticity	WX		0.249	0.299	0.349	--	Note5 Note6
	WY		0.273	0.323	0.373	--	
Luminance	L		400	500	--	cd/m^2	Note6
Transmittance	Tr		--	3.5	--	%	

Test Conditions:

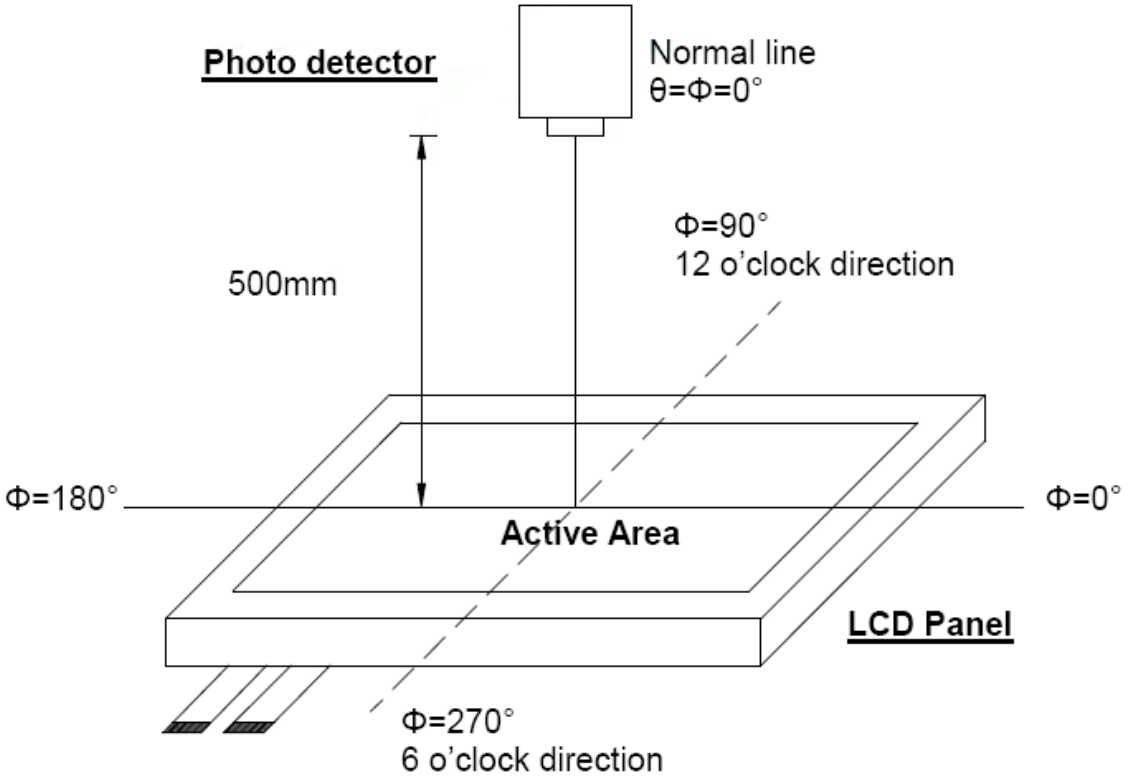
1. Vled = 12V, I_L = 180mA (Backlight current), the ambient temperature is 25℃.
2. The test systems refer to Note 2.

Note 1 : Definition of viewing angle range



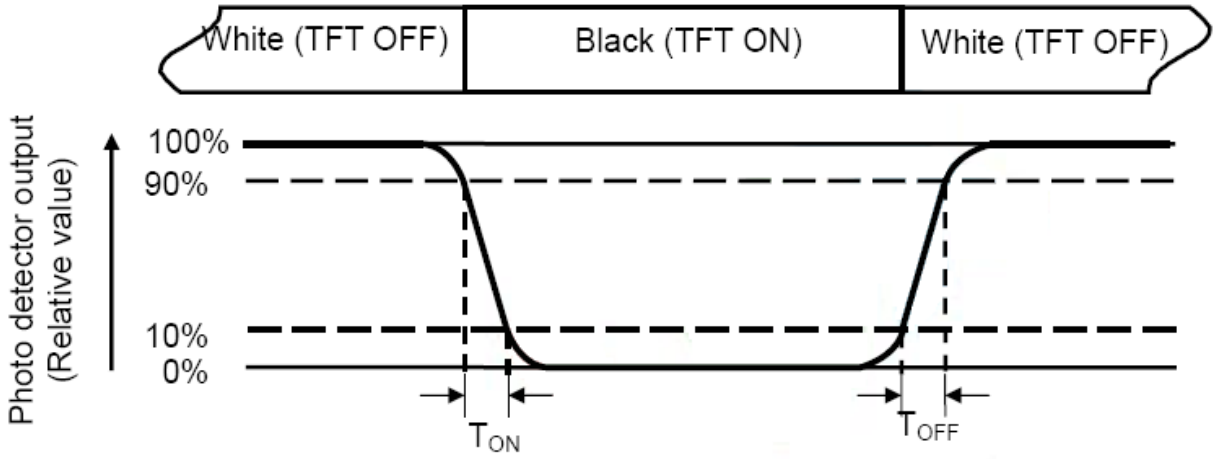
Note 2 : Definition of optical measurement system.

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° / 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 (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) 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

TFT LCD Panel Driving Section

Pin No.	Symbol	I/O	Description	Note
1	VCOM	P	Common Voltage	
2	VDD	P	Power Voltage	
3	VDD	P	Power Voltage	
4	NC	--	No connection	
5	Reset	I	Global reset pin	
6	STBYB	I	Standby mode, Normally pulled high	1
7	GND	P	Ground	
8	RXIN0-	I	- LVDS differential data input	
9	RXIN0+	I	+ LVDS differential data input	
10	GND	P	Ground	
11	RXIN1-	I	- LVDS differential data input	
12	RXIN1+	I	+ LVDS differential data input	
13	GND	P	Ground	
14	RXIN2-	I	- LVDS differential data input	
15	RXIN2+	I	+ LVDS differential data input	
16	GND	P	Ground	
17	RXCLKIN-	I	- LVDS differential clock input	
18	RXCLKIN +	I	+ LVDS differential clcok input	
19	GND	P	Ground	
20	RXIN3-	I	- LVDS differential data input	
21	RXIN3+	I	+ LVDS differential data input	
22	GND	P	Ground	
23	NC	--	No connection	
24	NC	--	No connection	
25	GND	P	Ground	

26	NC	--	No connection	
27	DIMO	O	Backlight CABC controller signal output	
28	SELB	I	6bit/8bit mode select	2
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	NC	--	No connection	
32	NC	--	No connection	
33	L/R	I	Horizontal inversion	4
34	U/D	I	Vertical inversion	4
35	VGL	P	Gate off Voltage	
36	CABCEN1	I	CABC H/W enable	3
37	CABCEN0	I	CABC H/W enable	3
38	VGH	P	Gate ON Voltage	
39	NC	--	No connection	
40	NC	--	No connection	

I : input, O : output, P : power

Note1. STBYB=”1”, normal operation
STBYB=”0”, timing control, source driver will turn off, all output are High-Z

Note2. If LVDS input data is 6 bits, SELB must be set to High.
If LVDS input data is 8bits, SELB must be set to LOW.

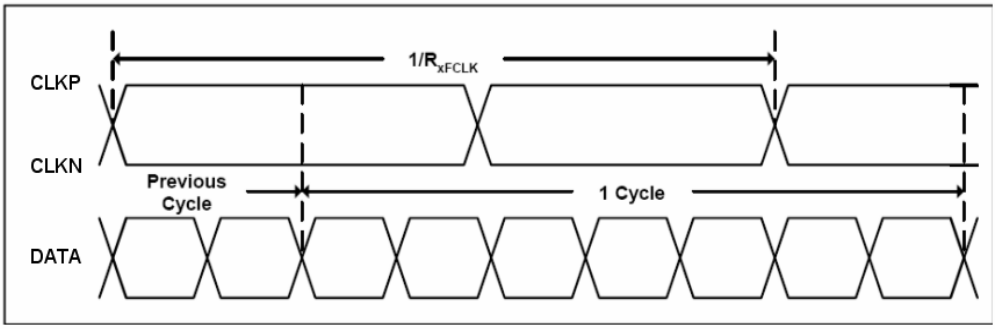
Note3. CABC_EN=”00”, CABC OFF.
CABC_EN=”01”, user interface image.
CABC_EN=”10”, still picture.
CABC_EN=”11”, moving image.
When CABC off, don’t connect DIMO, else connect it to backlight.

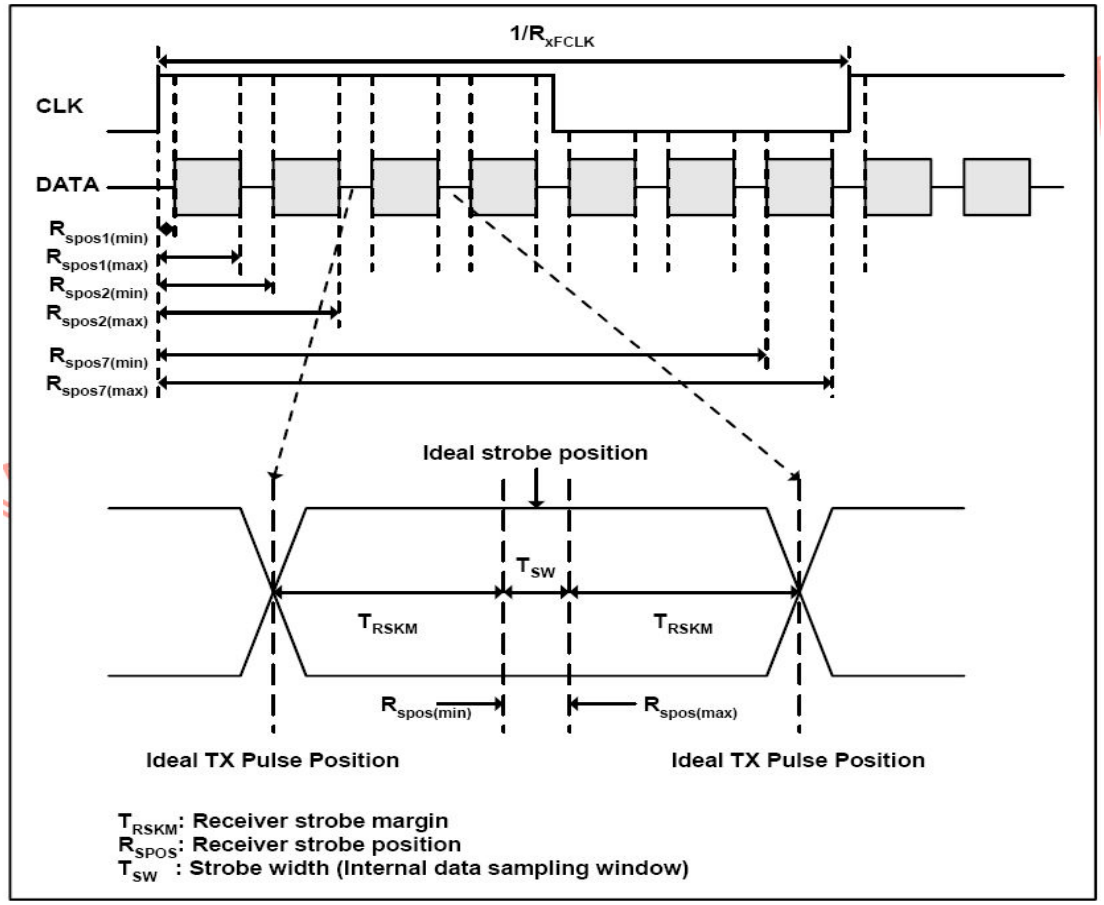
Note4. L/R=”0” set right to left scan direction
L/R=”1” set left to right scan direction.
U/D=”0” set top to bottom scan direction.
U/D=”1” set bottom to top scan direction.

7. TIMING CHARACTERISTICS

7-1 AC Electrical Characteristics

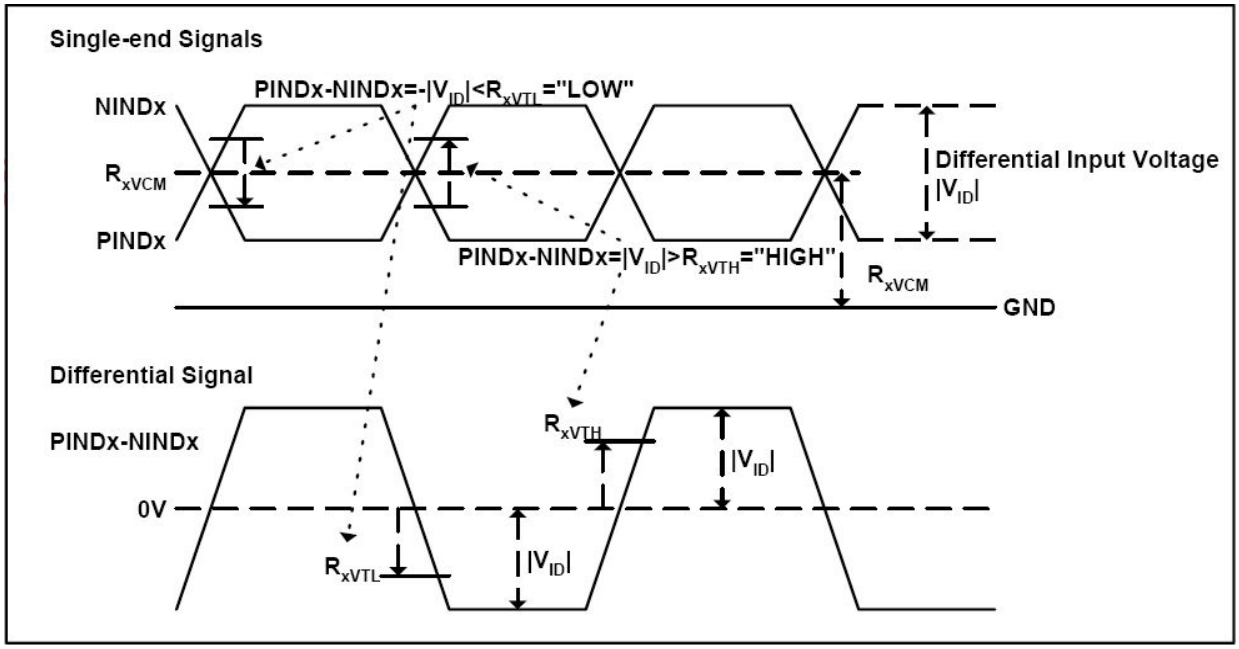
Parameter	Symbol	Values			Unit	Remark
		MIN	TYP	MAX		
Clock frequency	R_{xFCLK}	40.8	51.2	71		
Input data skew margin	T_{RSKM}	500	--	--		
Clock high time	T_{LVCH}	--	4/(7* R_{xFCLK})	--		
Clock low time	T_{LVCL}	--	3/(7* R_{xFCLK})	--		





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	

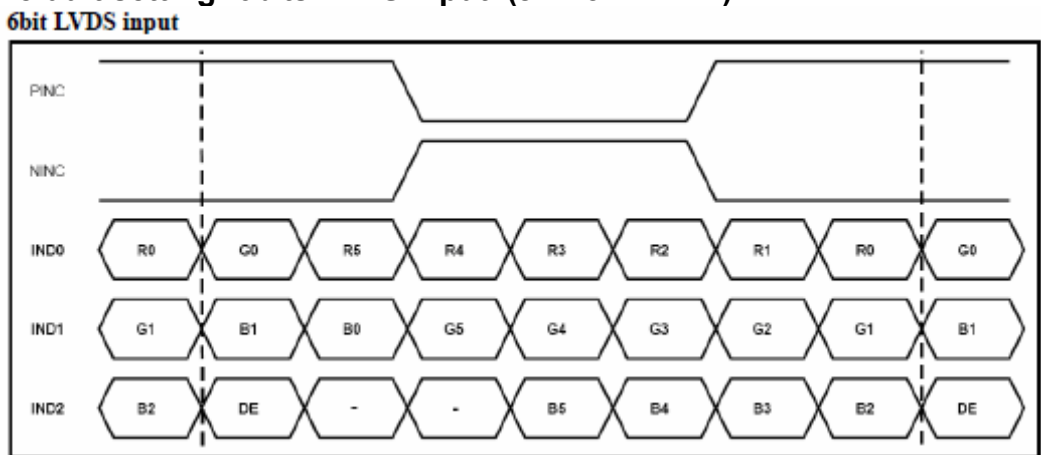


7-3 Timing

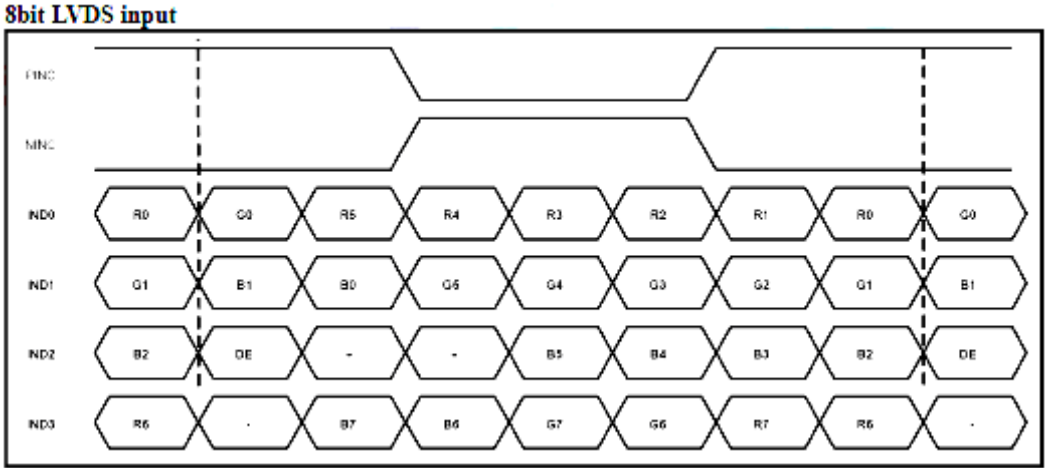
Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Clock Frequency	fclk	40.8	51.2	67.2	MHz	Frame rate =60Hz
Horizontal display area	thd		1024		DCLK	
HS period time	th	1114	1344	1400	DCLK	
HS Blanking	thb	90	320	376	DCLK	
Vertical display area	tvd		600		H	
VS period time	tv	610	635	800	H	
VS Blanking	thb	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	Ts = 70℃ 240 hrs	Note 2,4
Low Temperature Operation	Ta = -20℃ 240 hrs	Note1,4
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

Liquid crystal is poisonous. Do not put it your month. 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. 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±10℃ 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.

9-5 Others

1. AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.
2. Do not apply fixed pattern data signal to the LCD module at product using. 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.

Operation with test pattern sustained for 4 hrs, then change to gray pattern immediately.
After 5 mins, the mura must be disappeared completely .

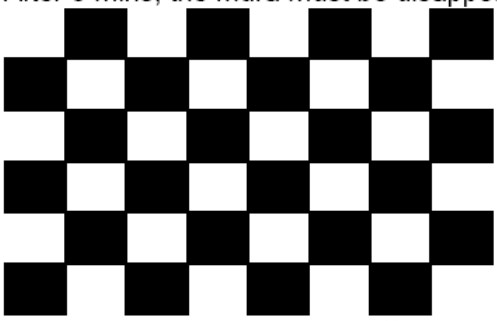
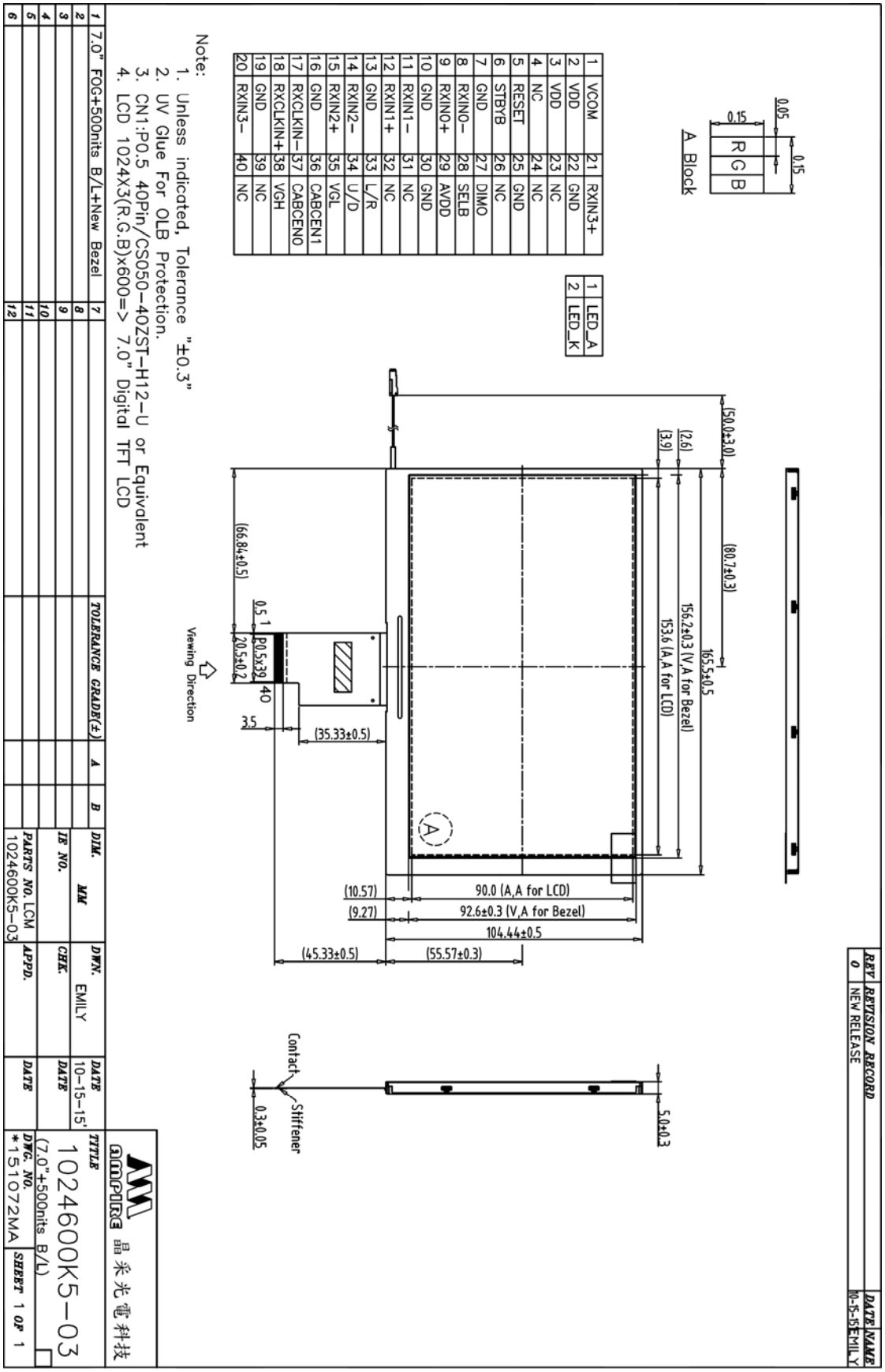


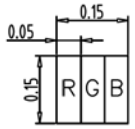
Image Sticking –pattern

Mid-Gray pattern

10. OUTLINE DIMENSION



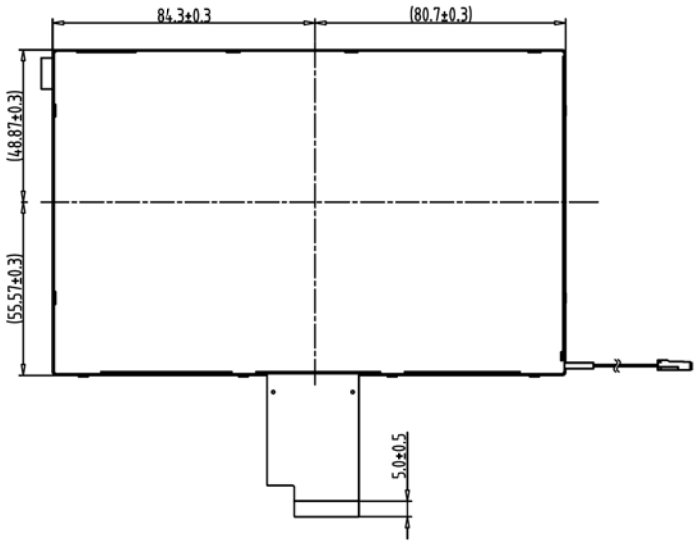
REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	10-15-15	EMILY



A Block

1	VCOM	21	RXIN3+
2	VDD	22	GND
3	VDD	23	NC
4	NC	24	NC
5	RESET	25	GND
6	STBYB	26	NC
7	GND	27	DIMO
8	RXIN0−	28	SELB
9	RXIN0+	29	AVDD
10	GND	30	GND
11	RXIN1−	31	NC
12	RXIN1+	32	NC
13	GND	33	L/R
14	RXIN2−	34	U/D
15	RXIN2+	35	VGL
16	GND	36	CABCEN1
17	RXCLKIN−	37	CABCEN0
18	RXCLKIN+	38	VGH
19	GND	39	NC
20	RXIN3−	40	NC

1	LED_A
2	LED_K



Back View

Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1:P0.5 40Pin/CS050-40ZST-H12-U or Equivalent
4. LCD 1024X3(R.G.B)x600=> 7.0" Digital TFT LCD

				TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. EMILY	DATE 10-15-15'	TITLE 1024600K5-03 (7.0"+500nits B/L)
1	7.0" FOG+500nits B/L+New Bezel	7								
2		8								
3		9					IE NO.	CHK.	DATE	
4		10								
5		11					PARTS NO. LCM-1 1024600K5-03	APPD.	DATE	DWG. NO. *151073MA / SHEET 1 OF 1
6		12								

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