



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-640480GBTNQW-A0H
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
2012/06/28	--	New Release	Kain

1. INTRODUCTION

This is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device . This model is composed of a 5.7inch TFT-LCD panel, a driving circuit. This TFT-LCD has a high resolution (640(R.G.B) X 480) and can display up to 262,144 colors .

1-1. Features

- VGA Resolution
- 6 Bits color driver with 1 channel TTL interface
- Wide range operation temperature
- Improved inner FPC material to better reliability.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	640RGB (W) x 480(H)	dots
Display area	115.2 (W) x 86.4 (H)	mm
Pixel pitch	0.18 (W) x 0.18 (H)	mm
Color configuration	R.G.B Vertical stripe	
Overall dimension	127.0(W)x99.63(H)x9.26(D)	mm
Surface treatment	Antiglare , Hard-Coating(3H)	
Brightness	1000	cd/m ²
Contrast ratio	600 : 1	
Backlight unit	LED	
Display color	262,144	colors
Viewing Direction	6 o'clock (Gray Inversion)	
Display Mode	Normally White	

3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN	MAX	UNIT
Power Supply Voltage	Vcc	-0.5	5	V
Signal Input Voltage	DCLK , DE R0~R5 G0~G5 B0~B5	-0.5	Vcc + 0.5	V
Operation Temperature	Top	-20	70	°C
Storage Temperature	Tstg	-30	80	°C

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

4. ELECTRICAL CHARACTERISTICS

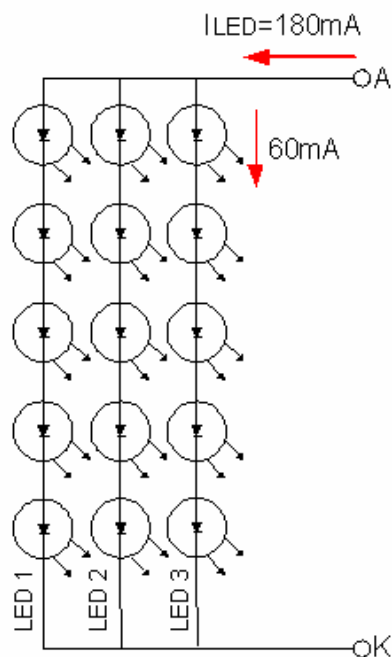
4-1 TFT LCD Module voltage

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Power Voltage For LCD	V_{CC}	3.0	3.3	3.6	V	
Logic Input Voltage	V_{IH}	$V_{CC} \cdot 0.7$	--	V_{CC}	V	
	V_{IL}	0	--	$V_{CC} \cdot 0.3$	V	
	V_{IL}	GND	--	0.3	V	

4-2 LED Backlight Conditions

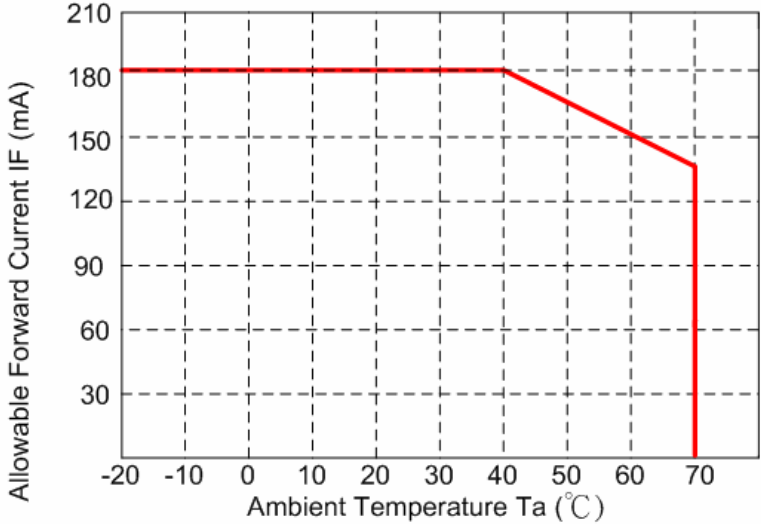
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED Backlight Voltage	V_{BL}	15.0	16.5	18.0	V	For reference
LED Backlight Current	I_{BL}	-	180	-	mA	$T_a = 25^\circ\text{C}$
LED Life Time			50K		Hr	Note*

Note* : Brightness to be decreased to 50% of the initial value.



The constant current source is needed for white LED back-light driving.

When LCM is operated over 60°C ambient temperature, the I_{BL} of the LED back-light should be adjusted to 150mA max



5. 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	RXIN0-	Transmission Data of Pixels
6	RXIN0+	Transmission Data of Pixels
7	GND	Power Ground
8	RXIN1-	Transmission Data of Pixels 1
9	RXIN1+	Transmission Data of Pixels 1
10	GND	Power Ground
11	RXIN2-	Transmission Data of Pixels 2
12	RXIN2+	Transmission Data of Pixels 2
13	GND	Power Ground
14	CKIN-	Sampling Clock
15	CKIN+	Sampling Clock
16	GND	Power Ground
17	VLED	POWER SUPPLY for Backlight : 5V
18	VLED	POWER SUPPLY for Backlight : 5V
19	GND	Power Ground
20	LEDADJ	PWM SIGNAL

6. INPUT SIGNAL

6-1 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↓	$C_L = 8 \text{ pF}$, 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)	$t_c = 15.38 \text{ ns}$ ($\pm 0.2\%$), Input clock jitter < 50 ps¶	550	700		ps
t_d Delay time, CLKIN↑ to CLKOUT↓ (see Figure 7)	$V_{CC} = 3.3 \text{ V}$, $t_c = 15.38 \text{ ns}$ ($\pm 0.2\%$), $T_A = 25^\circ\text{C}$	3	5	7	ns
t_{en} Enable time, $\overline{\text{SHTDN}}$ to phase lock	See Figure 7	1			ms
t_{dis} Disable time, $\overline{\text{SHTDN}}$ to off state	See Figure 8	400			ns
t_t Transition time, output (10% to 90% t_r or t_f) (data only)	$C_L = 8 \text{ pF}$	3			ns
t_t Transition time, output (10% to 90% t_r or t_f) (clock only)	$C_L = 8 \text{ pF}$	1.5			ns
t_w Pulse duration, output clock		0.50 t_c			ns

† All typical values are at $V_{CC} = 3.3 \text{ V}$, $T_A = 25^\circ\text{C}$.

§ 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 $t_{(RSKM)} = t_c/14 - 550 \text{ ps}$.

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

PARAMETER MEASUREMENT INFORMATION

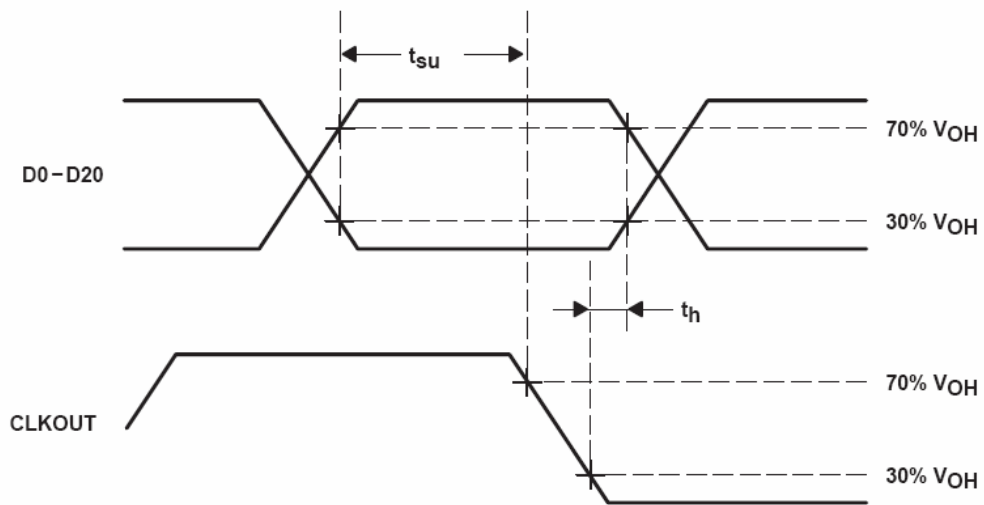


Figure 5. Setup and Hold Time Waveforms

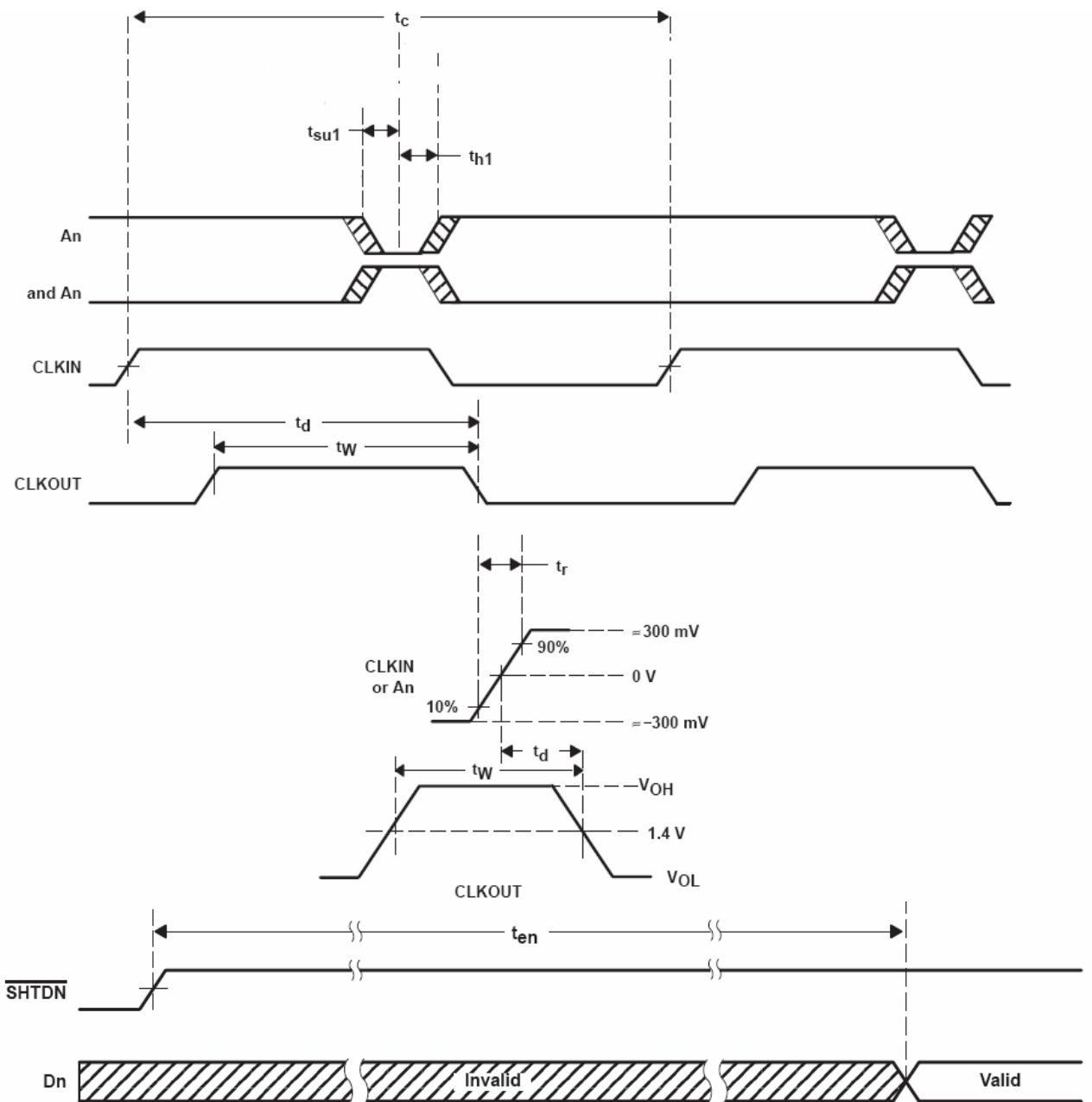


Figure 7. Enable Time Waveforms

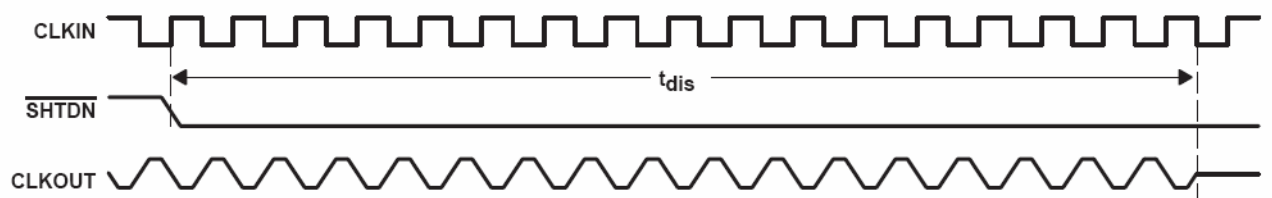


Figure 8. Disable Time Waveforms

6-2 Color Data Assignment

COLOR	Input Data	R DATA						G DATA						B DATA					
		R5 MSB	R4	R3	R2	R1	R0 LSB	G5 MSB	G4	G3	G2	G1	G0 LSB	B5 MSB	B4	B3	B2	B1	B0 LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	GREEN (2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	GREEN (62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
GREEN (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	
BLUE	BLUE (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE (62)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
BLUE (63)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	

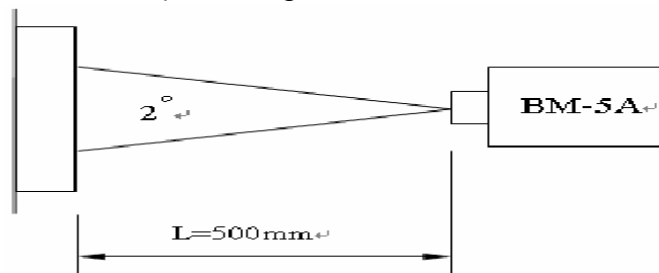
NOTE: (1) Definition of Gray Scale , Color(n) : n is series of Gray Scale
The more n value is the bright Gray Scale
(2) Data : 1-High , 0-Low

7. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast ratio	CR	Point - 5 $\Theta = \Phi = 0^\circ$	500	600	--	--	(1)(2)(3)	
Luminance	Lw		--	1000	-	cd/m ²	(1)(3)	
Luminance Uniformity	ΔL		70	75	-	%	(1)(3)	
Response Time (White – Black)	$T_r + T_f$		--	50	--	ms	(1)(3)(5)	
Viewing Angle	Vertical	Θ	$CR \geq 10$	100	130	--	Deg.	(1)(2)(4)
	Horizontal	Φ		120	150	--		
Color chromaticity	Red	Rx	Point - 5 $\Theta = \Phi = 0^\circ$	0.566	0.616	0.666	--	(1)(3)
		Ry		0.302	0.352	0.402		
	Green	Gx		0.308	0.358	0.408		
		Gy		0.518	0.568	0.618		
	Blue	Bx		0.096	0.146	0.196		
		By		0.086	0.136	0.186		
	White	Wx		0.296	0.346	0.396		
		Wy		0.328	0.378	0.428		

NOTE :

- (1) Measure conditions : $25^\circ\text{C} \pm 2^\circ\text{C}$, $60 \pm 10\% \text{RH}$ under 10Lux , in the dark room by BM-7TOPCON) ,viewing 2° , $VCC=3.3\text{V}$, $VDD=3.3\text{V}$



- (2) Definition of Contrast Ratio :

Contrast Ratio (CR) = (White) Luminance of ON \div (Black) Luminance of OFF

- (3) Definition of Luminance :

Definition of Luminance Uniformity

Measure white luminance on the point 5 as figure8-1

Measure white luminance on the point 1 ~ 9 as figure8-1

$$\Delta L = [L(\text{MIN}) / L(\text{MAX})] \times 100\%$$

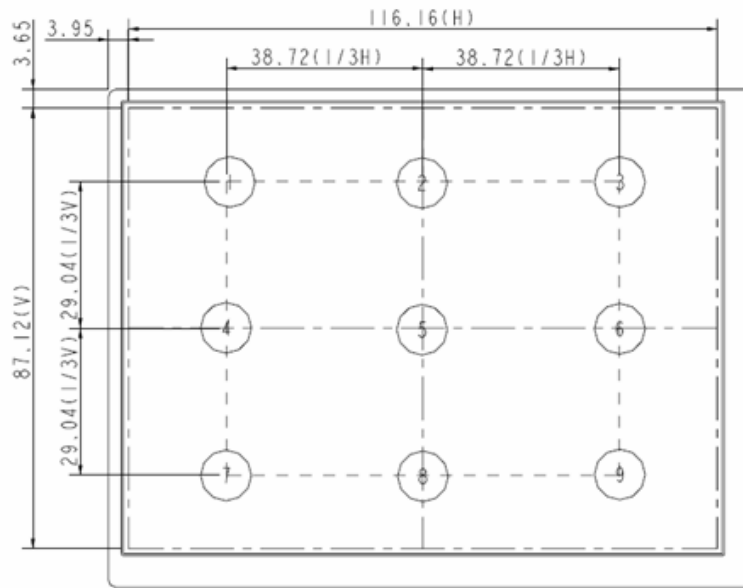


Figure 8-1

(4) Definition of Viewing Angle(Θ, Φ), refer to Fig8-2 as below :

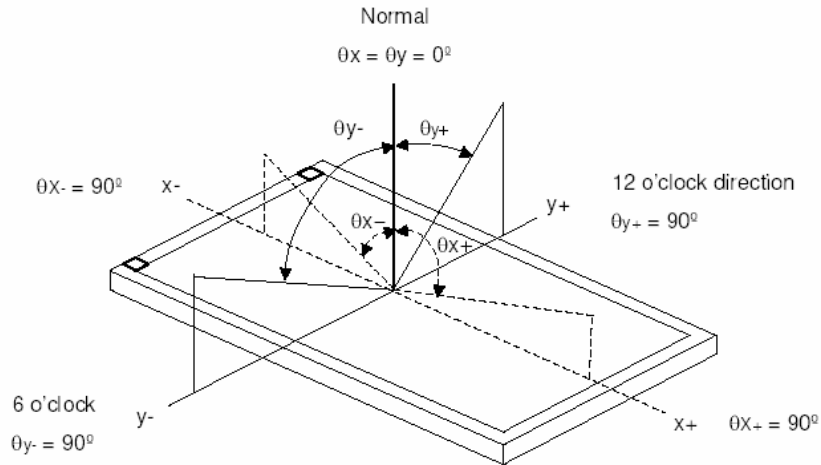
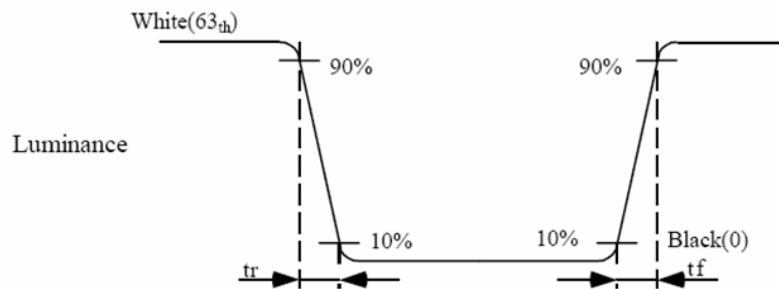


Figure 8-2

(5) Definition of Response Time.(White – Black)



8. RELIABILITY TEST CONDITIONS

ITEM	CONDITIONS
HIGH TEMPERATURE OPERATION	70°C , 240Hrs
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	60°C , 90%RH , 240Hrs
HIGH TEMPERATURE STORAGE	80°C , 240Hrs
LOW TEMPERATURE OPERATION	-20°C , 240Hrs
LOW TEMPERATURE STORAGE	-30°C , 240Hrs
THERMAL SHOCK	-30°C (0.5Hr) ~80°C (0.5Hr) 200Cycle

9. USE PRECAUTIONS

9-1 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.

9-2 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

9-3 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.

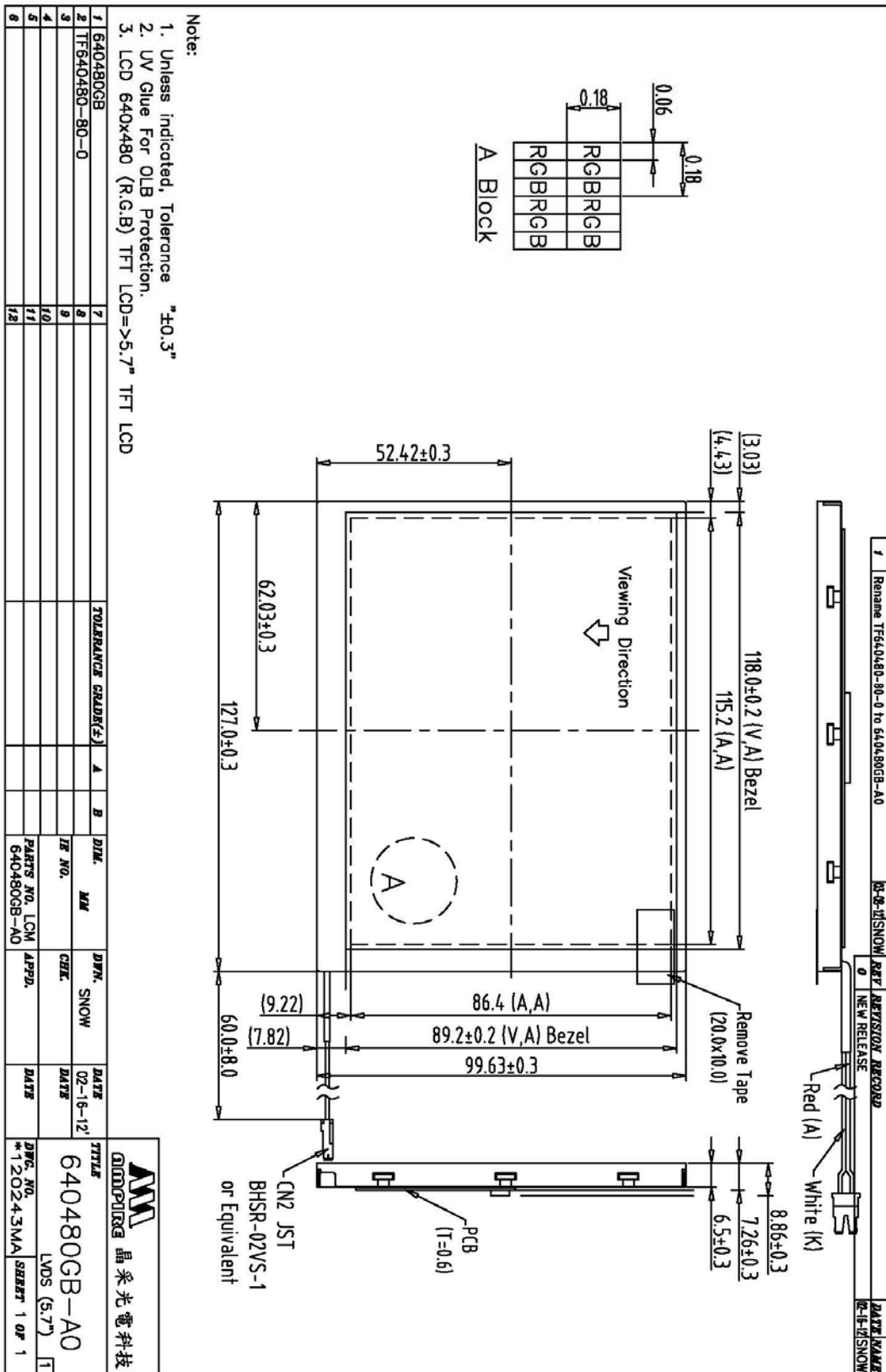
9-4 Operating precautions

- (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.

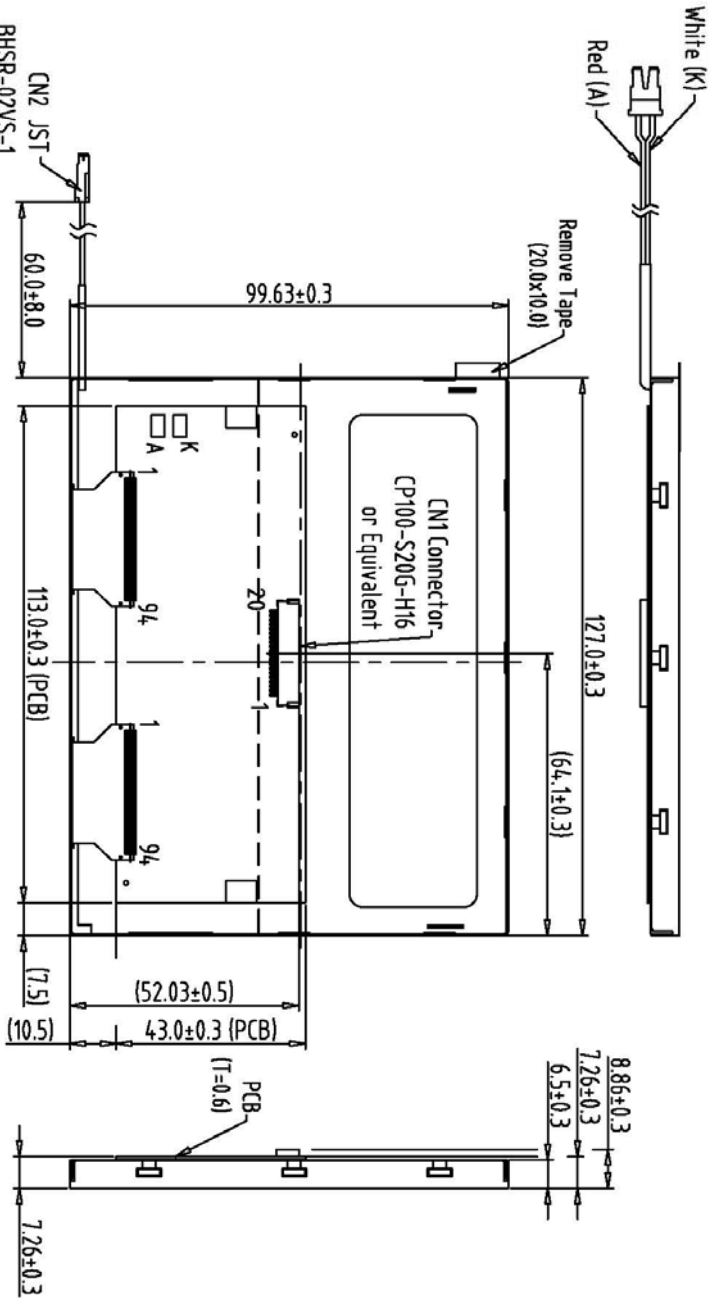
9-5 Other

- (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..

10. OUTLINE DIMENSION



REV.	REVISION RECORD	DATE	NAME
0	NEW RELEASE	02-16-12	R-S-SNOW
1	Rename TF640480-80-0 to 640480GB-A0	05-08-12	R-S-SNOW



CN1	
1	VCC
2	VCC
3	GND
4	GND
5	RXIN0-
6	RXIN0+
7	GND
8	RXIN1-
9	RXIN1+
10	GND
11	RXIN2-
12	RXIN2+
13	GND
14	CKIN-
15	CKIN+
16	GND
17	VLED
18	VLED
19	GND
20	ADJ

- Note:
1. Unless indicated, Tolerance "±0.3"
 2. UV Glue For OLB Protection.
 3. Main LCD 640x480 (R.G.B) TFT LCD => 5.7" TFT LCD

Back view

NO.	ITEM NO.	DESCRIPTION	QTY	UNIT	REVISION	DATE	BY	CHK	APPD.	DATE
1	640480GB									
2	TF640480-80-0									
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										


晶采光电科技
640480GB-A0
 LINDS (5.7")
 PARTS NO. 120244MA
 SHEET 1 OF 1