

Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD



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-640480GDTNQW-B0H
APPROVED BY	
DATE	

Approved For Specifications

Approved For Specifications & Sample

AMPIRE CO., LTD.

**4F., No.116, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei
City221, 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)

APPROVED BY	CHECKED BY	ORGANIZED BY

Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2012/05/14	--	New Release	Rober
2012/06/27	13,14	Revised the mechanical drawing.	Emil
2012/06/27	-	Issued the official P/N to AM-640480GDTNQW-B0H.	Emil
2012/06/27	4	Mention the LED life time and revised the consumptive current of LED.	Emil
2012/10/19	3	Correct the view angle (gray inversion).	Emil

Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

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 and LED backlight system . This TFT-LCD has a high resolution (640(R.G.B) X 480) and can display up to 16.7Mcolors .

1-1. Features

- VGA Resolution
- 8 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)x98.43(H)x7.5(D)---(Typ)	mm
Surface treatment	Antiglare , Hard-Coating(3H)	
Brightness	500	cd/m ²
Contrast ratio	250 : 1	
Backlight unit	LED	
Display color	16.7M	colors
Viewing Direction	12 o'clock (Gray Inversion)	
Display Mode	Normally White	

Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN	MAX	UNIT	NOTE
Power Supply Voltage	V _{cc}	-0.5	5	V	
Signal Input Voltage	DCLK , DE PD0~PD7 PD8~PD15 PD16~PD23	-0.5	V _{cc} + 0.5	V	
Operation Temperature	Top	-20	70	°C	(1)
Storage Temperature	Tstg	-30	80	°C	(1)

4. ELECTRICAL CHARACTERISTICS

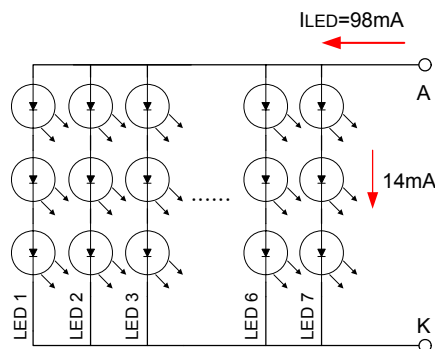
4-1 TFT LCD Module voltage

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Power Voltage For LCD	V _{CC}	3.0	3.3	3.6	V	(1)
LCD Power Current	I _{CC}	-	106	-	mA	
Logic Input Voltage	V _{IH}	V _{CC} *0.7	--	V _{CC}	V	
	V _{IL}	0	--	V _{CC} *0.3	V	
ADJ Input Voltage	V _{IH}	3.0	--	5.0	V	
	V _{IL}	GND	--	0.3	V	

4-2 LED B/L Driving Conditions

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	CONDITION
LED Backlight Voltage	V _{AK}	-	9.6	-	V	I _{BL} = 180mA
LED Backlight Current	I _{AK}	-	98	-	mA	T _a =25°C
LED Life time	-		40		kHrs	Note T _a =25°C

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



Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

5. INTERFACE

Pin No	Symbol	Function
1	Vss	Power Ground
2	Vss	Power Ground
3	Vcc	Power Supply for LCD
4	Vcc	Power Supply for LCD
5	PD16	Data 16
6	PD17	Data 17
7	PD18	Data 18
8	PD19	Data 19
9	PD20	Data 20
10	PD21	Data 21
11	PD22	Data 22
12	PD23	Data 23
13	PD8	Data 8
14	PD9	Data 9
15	PD10	Data 10
16	PD11	Data 11
17	PD12	Data 12
18	PD13	Data 13
19	PD14	Data 14
20	PD15	Data 15
21	PD0	Data 0
22	PD1	Data 1
23	PD2	Data 2
24	PD3	Data 3
25	PD4	Data 4
26	PD5	Data 5
27	PD6	Data 6
28	PD7	Data 7
29	Vss	Power Ground
30	DCLK	Clock Signals
31	PCI	Display ON/OFF
32	Hsync	Horizontal SYNC. (Sync mode used)
33	Vsync	Vertical SYNC. (Sync mode used)
34	DE	Data Enable
35	LED_A	Backlight of Anode
36	LED_A	Backlight of Anode
37	Vss	Power Ground
38	Vss	Power Ground
39	LED_K	Backlight of Cathode
40	LED_K	Backlight of Cathode

Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

7. INPUT SIGNAL :

7-1 Timing Specification.

PARAMETER	Symbol	Min.	Typ.	Max	Unit
CLK frequency	F_{CPH}		25.175		MHz
CLK period	T_{CPH}	-	39.7	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	-	800	-	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-first horizontal data time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
VS-DEN time	T_{STV}	-	35	-	T_H
VS period	T_V	-	525	-	T_H

Note: When SYNC mode is used, 1st data start from 144th CLK after HS falling (when $STHD[5:0]=00000$)

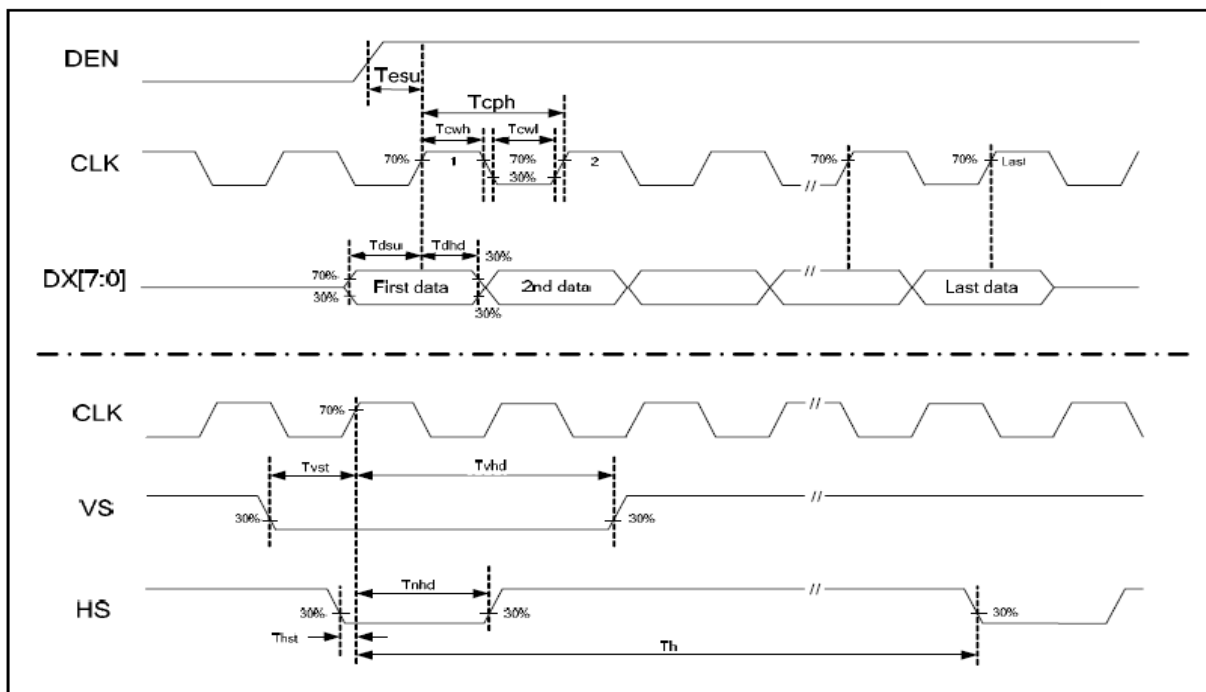
PARAMETER	Symbol	Min.	Typ.	Max	Unit
OEV pulse width	T_{OEV}		100	-	T_{CPH}
CKV pulse width	T_{CKV}	-	96	-	T_{CPH}
HS-CKV time	T_1	-	52	-	T_{CPH}
HS-OEV time	T_2	-	8	-	T_{CPH}
HS-POL time	T_3	-	72	-	T_{CPH}
STV setup time	T_{SUV}	-	46	-	T_{CPH}
STV pulse width	T_{WSTV}	-	1	-	T_H

Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

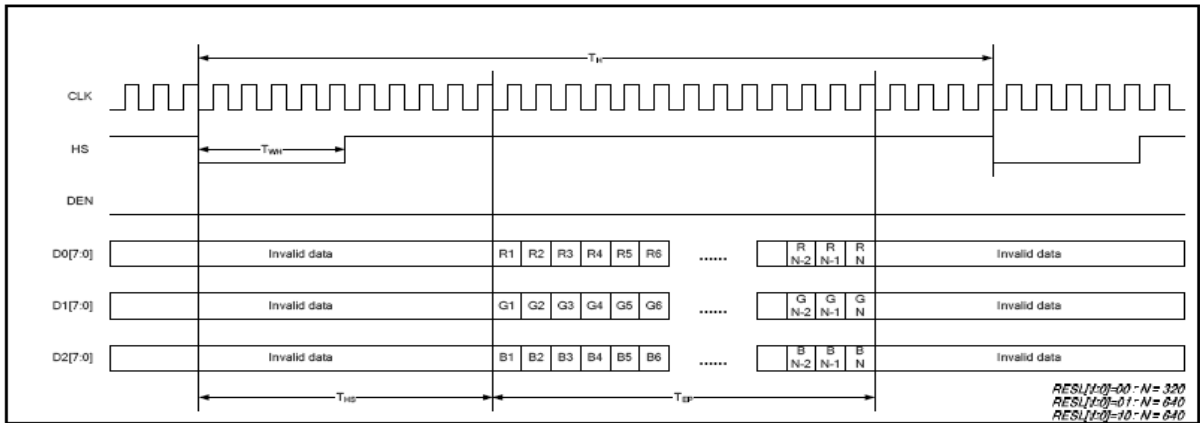
7-2 Timing chart

Clock and Data input waveforms

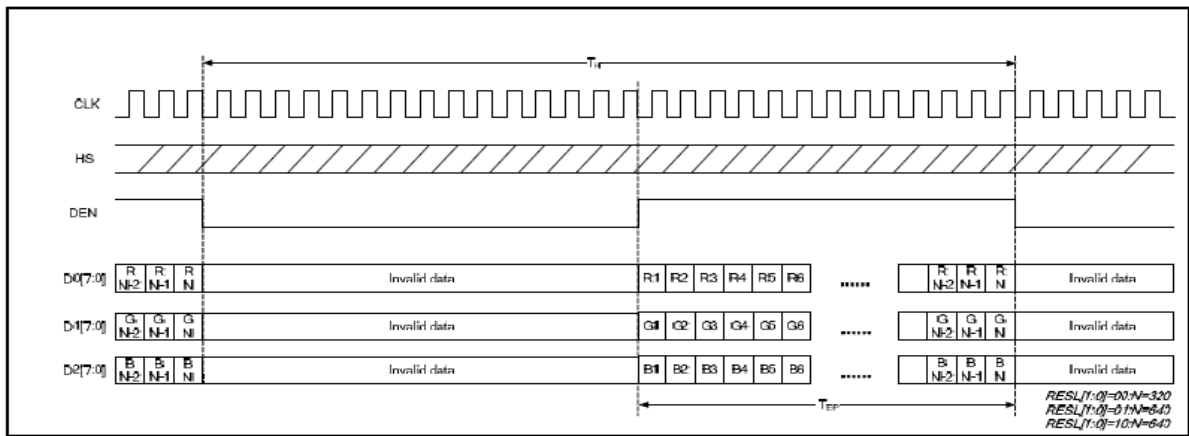


Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD



Parallel RGB SYNC Mode Horizontal Data Format



Parallel RGB DE Mode Horizontal Data Format

Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

7-3 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

Preliminary

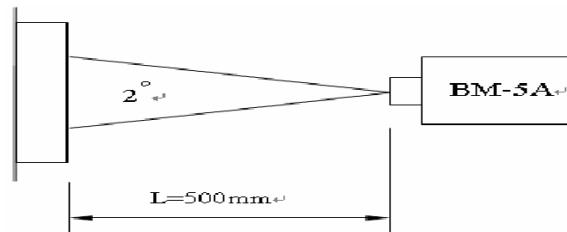
The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

8. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast ratio	CR	Point - 5 $\Theta = \Phi = 0^\circ$	200	250	--	--	(1)(2)(3)	
Luminance	Lw		--	500	-	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	Up (12H)	Θ_{y+}	$CR \geq 10$	--	55	-	Deg.	(1)(2)(4)
	Bottom(6H)	Θ_{y-}		--	45	-		
	Left (3H)	Θ_{x-}		--	70	-		
	Right (9H)	Θ_{x+}		--	70	-		
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°C±2°C , 60±10%RH under 10Lux , in the dark room by BM-7TOPCON) ,viewing 2° , VCC=3.3V , VDD=3.3V



- (2) Definition of Contrast Ratio :

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

- (3) Definition of Luminance :

Definition of Luminance Uniformity

Measure white luminance on the point 5 as figure9-1

Measure white luminance on the point 1 ~ 9 as figure9-1

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

Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

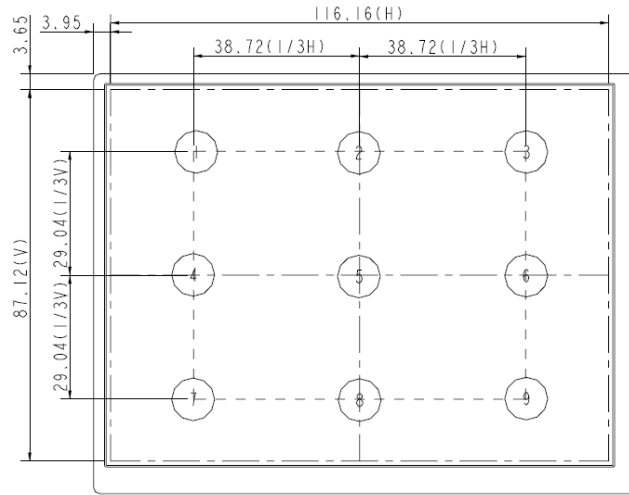
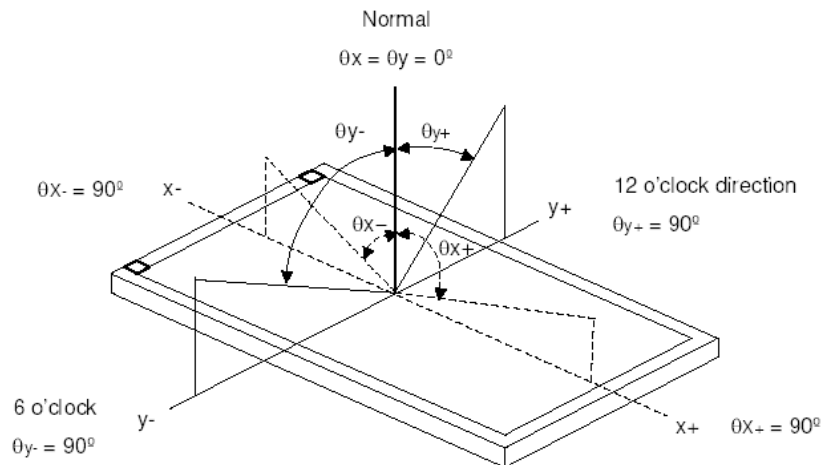


Fig9-1 Measuring point

(4) Definition of Viewing Angle(Θ, Φ), refer to Fig9-2 as below :



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

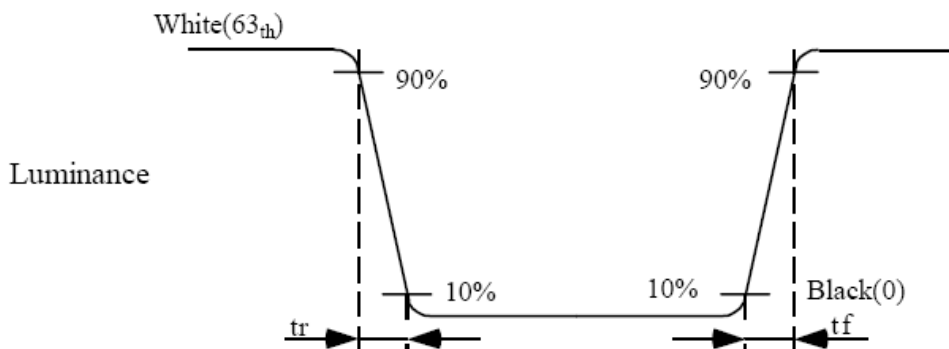


Fig9-3 Definition of Response Time(White-Black)

Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

9. RELIABILITY TEST CONDITIONS

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=240 hrs	
Low Temperature Operation	-20±3°C , t=240 hrs	
High Temperature Storage	80±3°C , t=240 hrs	1,2
Low Temperature Storage	-30±3°C , t=240 hrs	1,2
Storage at High Temperature and Humidity	60°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-20°C (30min) ~ 70°C (30min) 100 cycles	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).

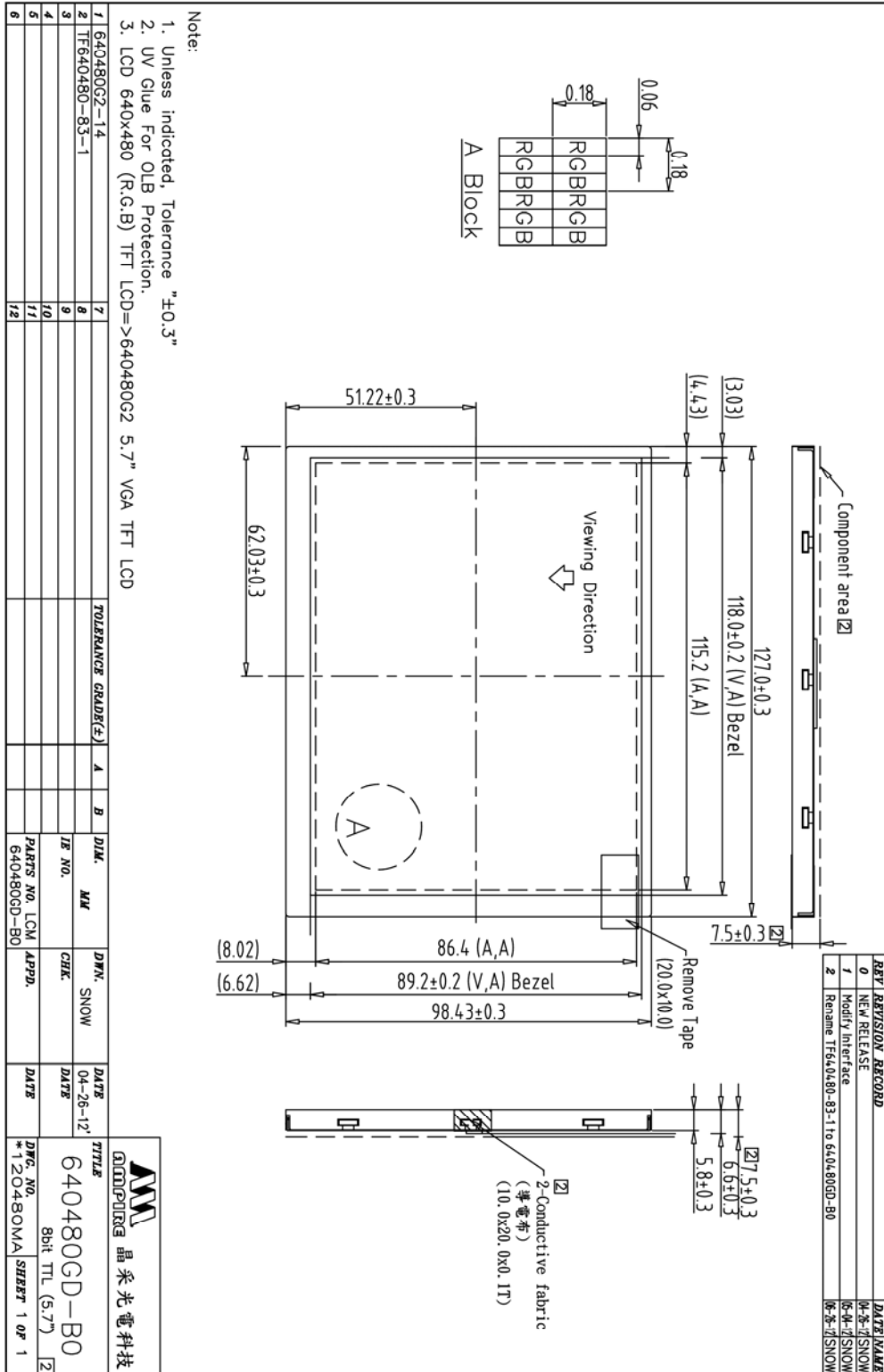
10. OTHERS

AMIPRE will provide one year warranty for all products and three months warrantee for all repairing products.

Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

11. OUTLINE DIMENSION



Preliminary

The contents of this document are confidential and must not be disclosed wholly or in part to any third part without the prior written consent of AMPIRE CO., LTD

